

arrangement permits easier access to either cylinder for cleaning, removing crusts, etc., without interrupting the continuous roasting process. At the lower end of the lower cylinder, is a slagging-hearth, into which the latter discharges, and which is also heated from the fire-place. In fact, the flame passes first into this hearth, and through it to the lower and thence to the upper cylinder. This combination of roasting and "silicating," intended to adapt the Brückner cylinder system for use as an adjunct to smelting-furnaces, requires, of course, efficient dust-chambers, or equivalent devices, such as the Ems arrangement, now so much in favor, or the tower filled with glass balls, which Mr. BRÜCKNER thinks may prove practically useful. The object is, of course, to get a large condensing surface, without occupying too much space with the apparatus.

We should be glad to see Mr. BRÜCKNER'S latest idea tested in practice.

CORRESPONDENCE.

[We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested. All letters should be addressed to the MANAGING EDITOR. We do not hold ourselves responsible for the opinions expressed by correspondents.]

Relative Economy of Spray and Surface-Cooled Air-Compressors.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In your issue of October 30th, 1886, you published an air-card taken from an Ingersoll compressor, which showed a thermal loss of only 3.6 per cent. On December 4th, you published a letter from me, in which, referring to this card, I respectfully invited the publication of a card from a compressor using the water-jacket system of cooling that would show a result equally good. I further challenged the production of a card showing a thermal loss as low even as 5 per cent.

Thus far, there has been no response to this challenge. But I now desire to offer a greater temptation to any who may still believe in water-jacket economy to prove their point.

I propose a competitive test. Let a cylinder be made of a size corresponding to the average compressor in use on the new Croton Aqueduct Tunnel. Let it be provided with the best surface-cooling attachments, and I will apply a spray-pump. Let three engineers be selected by the American Society to test each system, taking indicator-cards under average conditions as to speed and pressure, such conditions to correspond with those existing on the aqueduct. Let it be agreed that the defeated party shall pay all expenses, and let the question to be determined be economy.

As this is a very interesting and important subject, I trust that the engineering public will co-operate with me in reaching a conclusive settlement. Yours truly,
WILLIAM L. SAUNDERS.
NEW YORK, Oct. 10, 1886.

Sodium Sulphide vs. Calcium Sulphide for Precipitating Silver from Lixivation Solutions.
EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Mr. O. Hofmann, in writing to the JOURNAL, January 8th, on the above subject, has allowed himself to fall into a great error in comparing his figures on the consumption of calcium sulphide with my own, figures that have no direct relation to each other. In place of giving us, as I have done, a comparative test between the two reagents, he simply makes a one-sided statement. The consumption of sodium or calcium sulphide depends by no means only upon the quantity of silver precipitated, but also upon the quantity of lead and copper in solution, leaving out other metals that may be neglected. Hence no comparison of statistics is possible unless the base metals are taken into consideration, or two tests are made in succession under exactly the same or only slightly changed conditions. In fact, the best and most reliable statistics would be obtained by neglecting the tons of ore leached, and its assay value altogether, and by simply comparing the quantities of silver, lead, and copper contained in the sulphides in each case, with the quantities of chemicals consumed. Since the chemical equivalent of silver is 1.04 times as large as that of lead, and 3.11 times as large as that of copper, the lead and copper can easily be computed as silver by multiplication with the above coefficients.

There is nothing to show in Mr. Hofmann's statement that the sulphides he obtained a year ago at the Cusihiuriachic mill were like those produced recently by Mr. Russell. There may have been a change in the character of the ore, in the result of roasting, etc. One fact, surely, Mr. Hofmann forgets entirely, namely, that he did not use any extra-solution, and that Russell did. If, for instance, one pound of copper had to be precipitated from the extra-solution per ton of ore in Russell's operations, that would be equivalent to precipitating 45.34 ounces of silver. Sodium or calcium sulphide thus consumed is to be charged to the expense of the extra-solution. Mr. Hofmann never considered this nor any other possible difference in circumstances, but arrives at a conclusion from entirely insufficient premises. His comparison is of no value whatever.

My own figures are not as exact as is desirable, but they are sufficiently reliable for practical purposes. As much as I am informed, the character of the ore treated in Russell's comparative tests was the same, and there was only a difference of 4 ounces of silver per ton in value.
NEW YORK, Jan. 10.

C. A. STETEFELDT.

Slag Foundations for Railroad Yards.—The Utah Central Railroad Company, to do away with the mud at its yards in Salt Lake City, is laying there large quantities of slag. The soil to a depth of from six inches to two feet was plowed up and carted off with scrapers, and in its place was laid the slag, the coarser at the bottom, the finer at the top, and a plentiful sprinkling of sand scattered over it. It is claimed that it hardens down like a brittle or porous rock; the water seeps down to the bottom, and mud is impossible.

GEOLOGIC DISTRIBUTION OF NATURAL GAS IN THE UNITED STATES.*

By Charles A. Ashburner, Geologist in Charge, Pennsylvania Survey, Philadelphia, Pa.

STRUCTURE OF GAS-PRODUCING ROCKS.

It is difficult to prescribe any fixed limits in the geological scale to the occurrence of natural gas and petroleum. Every known rock, except the eruptive rocks, contains the remains of organic matter, animal and vegetable; and since it is quite certain that both oil and gas result from the decomposition of organic remains, it is quite possible to find oil and gas in rocks of any geological age subsequent to the Archæan, or rocks without life; in some rocks, in commercial quantities; and in other rocks, in quantities so small as to be only of scientific interest to the geologist and mineralogist.

Next to the necessity of having a sedimentary bed, such as sandstone, shale, or slate, in which animal or vegetable remains of past geological ages have been buried, or a limestone bed made from water shells, the presence of natural gas is dependent upon the existence of a porous or cavernous rock to serve as a reservoir to hold the gas, and of an overlying impervious rock-roof to confine the gas. The other necessary conditions for the occurrence of gas are more dependent upon the forces to which the strata have been subjected, and the resulting geological structure, than upon the age of the rocks themselves.

The practical necessity of gas-explorers first understanding the structure of the rocks in any locality where explorations are planned is tersely set forth by Professor Lesley.

"First of all, there can be no gas stored up in the oldest rocks.

"Secondly, there can be no gas left underground where the old rocks have been turned up on edge and overturned, fractured and re-cemented, faulted and disturbed in a thousand ways. If there ever was any, it has long since found innumerable ways of escape into the atmosphere.

"Thirdly, there is not the least chance that any gas is left underground in the greatly folded, faulted, crushed, and hardened formations. Where the oil and gas-rocks rise to the surface as they do in a thousand places, they show that all their oil and gas have escaped long ago.

"Where the rock-formations lie pretty flat and have remained nearly undisturbed over extensive areas, there is always a chance of finding gas (if not oil) at some depth beneath the surface determined by the particular formation which appears at the surface.

"And, finally, wherever rock-oil has been found, there, and in the surrounding region, rock-gas is sure to exist."

VALUE OF GEOLOGY TO GAS EXPLORERS.

Although petroleum and gas have both been reported as existing in a majority of the States, and occurring in geological formations from the glacial drift of the Quaternary system, down to the Trenton limestone at the base of the Paleozoic system, yet at present our prominent producing gas districts are confined to New York, Pennsylvania, and Ohio; and the gas comes from the Paleozoic strata. In a number of other States, the oil and gas shows are sufficient to warrant a practical exploration for natural gas.

The tendency among practical oil and gas-well drillers and operators to discover in a new district the same section of rocks as found in an old district, however distant the new district may be from the old, makes it important that both drillers and operators should realize the fact, as proved by geological investigation, that no two wells can be put down, distant from one another but a few miles, where the same section of rocks may be found in both wells.†

All the oil and gas in the three States referred to have been found in the sandstone, shale, and limestone strata of the Paleozoic system, with the exception of a small amount of gas that has been found in the glacial drift in several States. The thickness of these strata ranges from 5000 feet in Ohio, to 30,000 feet in Central Pennsylvania, to 11,000 feet in Eastern New York. On account of the varying thickness of the rocks, it is readily perceived that a knowledge of the different individual formations in special localities where gas explorations are to be carried on, is of the highest importance.

ROCK SECTIONS IN NEW YORK, PENNSYLVANIA, AND OHIO.

The succession and thickness of the Paleozoic rocks in New York, Pennsylvania, and Ohio is indicated on the accompanying chart.

In Central Pennsylvania, where, on account of structural reasons, it is absolutely impossible to find oil or gas, the Paleozoic rocks are generally thicker than elsewhere in the three States. I have given a section of Central Pennsylvania, not because it is of any special use to oil and gas prospectors, but because it furnishes additional evidence of the thickening and thinning of our geological formations in different directions.

Even within the limits of the oil regions proper, the formations through which many oil and gas-wells have been drilled vary greatly. The Venango-Butler group of oil rocks, which I consider in a general way equivalent to the Catskill sandstone No. IX., varies in thickness from 250 feet in McKean County, to 500 feet in Alleghany County; while the thickness of the Pocono sandstone between McKean and Fayette counties varies from 250 to 650 feet.

In the Helderberg hills, in the vicinity of Knowersville, in New York, where gas has recently been found in the Hudson River shales, the Clinton, Medina, and Oneida formations have thinned out to a knife-edge, and the lower Helderberg and Niagara limestones rest directly on top of the Hudson River shales.

In Blair County, Pennsylvania, immediately in front of the Alleghany Mountain escarpment, the Clinton, Medina, and Oneida formations have a combined thickness of 3200 feet, so that if any gas exists in the Hudson River shales, or in the Trenton limestones in the vicinity of Pittsburg, 80 miles west of Blair County, it must be at such a depth that it would be absolute folly to talk of drilling for it.

* Abstract of a paper read before the American Institute of Mining Engineers, at the St. Louis Meeting, October, 1886.

† The Dilworth well, being drilled by Mr. George Westinghouse, Jr., at Homewood, Alleghany County, Pa., had attained a depth of 4618 feet December 1st, 1886, and is still being drilled deeper. This is the deepest bore-hole that has been drilled on the continent. The last report I have of the Spersberg well, near Berlin, gives the depth as 5170 feet.

Chart showing the Divisions and Prominent Thicknesses of the Rocks of the Palaeozoic System in New York, Pennsylvania and Ohio, by Charles A. Ashburner.

Periods.	Divisions of Palaeozoic Strata in Ohio by Professors Newberry and Orton.	Locality.	Divisions of Palaeozoic Strata in New York and Pennsylvania, by Professors Rogers, Hall, Lesley, and others.	General Locality of Sections.					
				Ohio.	W. & S. W. Penna.	S. W. New York & N. W. Penna.	Central Penna.	E. & N. E. Penna.	Catskill Region, N. Y.
				Orton, 1886.	Stevenson, Carl & White.	Ashburner.	Ashburner, Sanders & Chance.	Ashburner, Hill & Winslow.	Ashburner.
		Feet.	Feet.	Feet.	Feet.	Feet.			
CARBONIFEROUS.	XIII	UPPER BARREN COAL MEASURES.	MONONGAHELA RIVER COAL SERIES. Upper Barren Measures.	680 ¹³ to 710 ¹³					
			a. Greene County Group.	325 ¹³ to 400 ¹³					
			b. Washington County Group.	458 ¹³ to 487 ¹³					
		UPPER PRODUCTIVE COAL MEASURES.	Upper Productive Coal Measures (Pittsburgh coal bed at base.)		360 ²¹	300 ²⁴ to 300 ²⁵			
		LOWER BARREN COAL MEASURES.	ALLEGHENY RIVER COAL SERIES. Lower Barren Measures (Mahoning S. S. at base.)	375 ¹³ to 625 ¹⁴		520 ²¹			
		LOWER PRODUCTIVE COAL MEASURES.	Lower Productive Coal Measures.	300 ¹⁵ to 450 ¹⁶	140 ¹⁹	230 ²¹ to 285 ²¹			
	XII	CONGLOMERATE SERIES.	Pottsville Conglomerate (Millstone Grit). a. Homewood and Johnson Run S. S. b. Conoquenessing and Kinzua Creek S. S. c. Piedmont S. S. and Olean Conglomerate.	150 ¹⁶ to 300 ¹⁷	150 ¹⁹ to 200 ¹⁹	129 ²² to 300 ²¹	100 ²⁶ to 1280 ²⁷		
	XI	SUB-CARBONIFEROUS LIMESTONE.	MAUCH CHUNK RED SHALE. Upper Shale. Mountain Limestone. Lower Shales.	50 ¹⁸ to 205 ¹⁷	10 ¹⁹	100 ²² to 1100 ²¹	150 ²⁸ to 2200 ²⁹		
	X	WAVERLY SERIES. Logan Shale, S.S. and Conglomerate. Cuyahoga Shale. Berea Shale and Grit. Bedford Shale.	POCONO SANDSTONE AND CONGLOMERATE. Upper Shales and Sandstones. Middle (Sub-Olean) S. S. and Conglomerate. Lower Shales and S. S. (Pit-hole Grit).	250 ¹⁹ to 650 ¹⁷	60 ¹⁹ 40 ¹⁹ 150 ¹⁹	1175 ²² to 2150 ²¹	1250 ³⁰	Highest peaks of Catskill Mountains contain 1000+.	
	DEVONIAN.	VIII	OHIO SHALE. Cleveland Shale. Erie Shale. Huron Shale.	CATSKILL (OLD RED) SANDSTONE. CHEMUNG SANDSTONES AND SHALES. PORTAGE SHALES AND SANDSTONES. Portage Sandstone. Gardean Shales. Chasqua Shales. GENESSEE SHALES AND SLATES.	250 ¹⁶ to 500 ¹⁴	250 ¹⁹	2100 ²² to 2680 ²¹	7145 ³⁰	
			HAMILTON SANDSTONES AND FLAGS. Tully Limestone. Moscow Shales. Hamilton Flags.	3000 ²⁰		325 ²¹ to 560 ²³	290 ²⁸	5300	
			MARCELLUS SLATES AND SHALES.			635 ²¹ to 1130 ²²	760 ³⁰	1975	
			UPPER HELDERBERG LIMESTONE. Seneca Limestone. Corniferous Limestone. Onondaga " Schoharie "		2000 ?	750 ²² to 875 ²¹	800 ³⁰		
		CORNIFEROUS LIMESTONE.							
VII		ORISKANY SANDSTONE.	CAUDA GALLI GRIT AND SANDSTONE. ORISKANY SANDSTONE.			0 ²² to 60 ²¹	340 ³⁰	Wanting (?)	
VI		LOWER HELDERBERG LIMESTONE.	LOWER HELDERBERG LIMESTONE. U. Pentamerus Limestone. Encrianal " Delthyris " L. Pentamerus " Tentaculite.						
		WATERLINE.	WATERLINE.						
		SALINA SHALES? NIAGARA SERIES. Hillsboro Sandstone. Guelph Limestone. Niagara Limestone and Shale.	SALINA OR ONONDAGA SALT GROUP. NIAGARA SHALES AND LIMESTONES.						
		CLINTON LIMESTONE.	CLINTON RED AND GRAY SHALES. Upper Shales (Sporadic Ore-beds). Ore Sandstone and Iron Ore-bed. Lower Shales (Sporadic Ore-beds.)						
SILURIAN.	IV	MEDINA SHALE.	MEDINA SANDSTONE. ONEIDA CONGLOMERATE.			1900 ²¹ to 2900 ²³	1125 ³⁰	Wanting.	
	III	CINCINNATI SERIES. Hudson River Limestone and Shale. Utica shale and Slate.	HUDSON RIVER SHALES AND SLATES. Loraine Shales. Frankfort Shales and Sandstones. Utica Shale, Slate and Limestone.			900 ²² to 1870 ²¹	6000 ³⁰	3500	
	II	TRENTON LIMESTONE. Galena Limestone. Trenton " Birdseye "	TRENTON LIMESTONE. Trenton Limestone. Black River " Birdseye "			7000 ²³	2000 ³⁰ ?	125 tested by drill possibly 500+ thick.	
	I	POTSDAM.	POTSDAM SANDSTONE. ACADIAN.						
Archaen System.			MONTALBAN. NORIAN AND HURONIAN. LAURENTIAN.					Thicknesses not determined in localities referred to.	

NOTES.—The index numbers attached to the individual rock thicknesses indicate the special districts in which the measurements were made as follows: 1. Eastern and Southeastern Ohio. 2. Central Ohio. 3. Western outcrop. 4. Canal Dover. 5. Southern outcrop. 6. Lucas County. 7. Ohio Valley. 8. Columbus Well. 9. Northern Ohio. 10. Southern Ohio. 11. Southwestern Ohio. 12. Findlay. 13. Greene and Washington counties. 14. Allegheny County. 15. Beaver County. 16. Elk County. 17. Fayette County. 18. Jefferson County. 19. McKean County. 20. Titusville. 21. Broad-top Mountain, Huntington County. 22. Section between Lock Haven and Farrandville. 23. Blair County. 24. Carbondale. 25. Pottsville. 26. Wilkes Barre. 27. Tamaqua. 28. Pittston. 29. Mauch Chunk. 30. Lehigh River.

A notable instance of a change in the thickness of the rocks that many of the Pennsylvania oil and gas wells have pierced is found in McKean and northern Elk counties. (See accompanying map and sections, Plate I.)

In the Dennis well, at Bradford, the top of the oil-sand is 1732 feet below the bottom of the Olean conglomerate, which is the bottom member of the Pottsville conglomerate, No. XII. This rock forms the most important key to the geological structure of all of those rocks that outcrop in Northwestern Pennsylvania. At Ridgway, which is 37 miles south of Bradford, the distance of the representative of the Bradford oil-sand, below the bottom of the Olean conglomerate, is 2374 feet, showing an aggregate thickening in the strata toward the south of 592 feet.

Although between Bradford and Ridgway there is a general thickening toward the south in all the formations lying between the Olean conglomerate and the Bradford oil-sand, yet the greatest thickening, as observed from the accompanying chart, is in the Pocono sandstone, No. X.

Persons ignorant of the general geology of this district have thought that the sand struck in the Ridgway Gas Company's well, at a depth of 2090 feet, was the sand that has produced such an abundance of gas in the Roy and Archer gas-pool, about seven miles west of Wilcox and five miles south of Kane; whereas the Ridgway well would have needed to be drilled to a depth of at least 2590 feet, to reach the position of this sand, if there was no thickening in the rocks between the Roy and Archer gas-pool and Ridgway. (TO BE CONCLUDED.)

THE DUNNACHIE CONTINUOUS REGENERATIVE GAS-KILN FOR BURNING
FIRE-BRICK, ETC.*

By Thomas Eggleston, Ph.D., New York City.

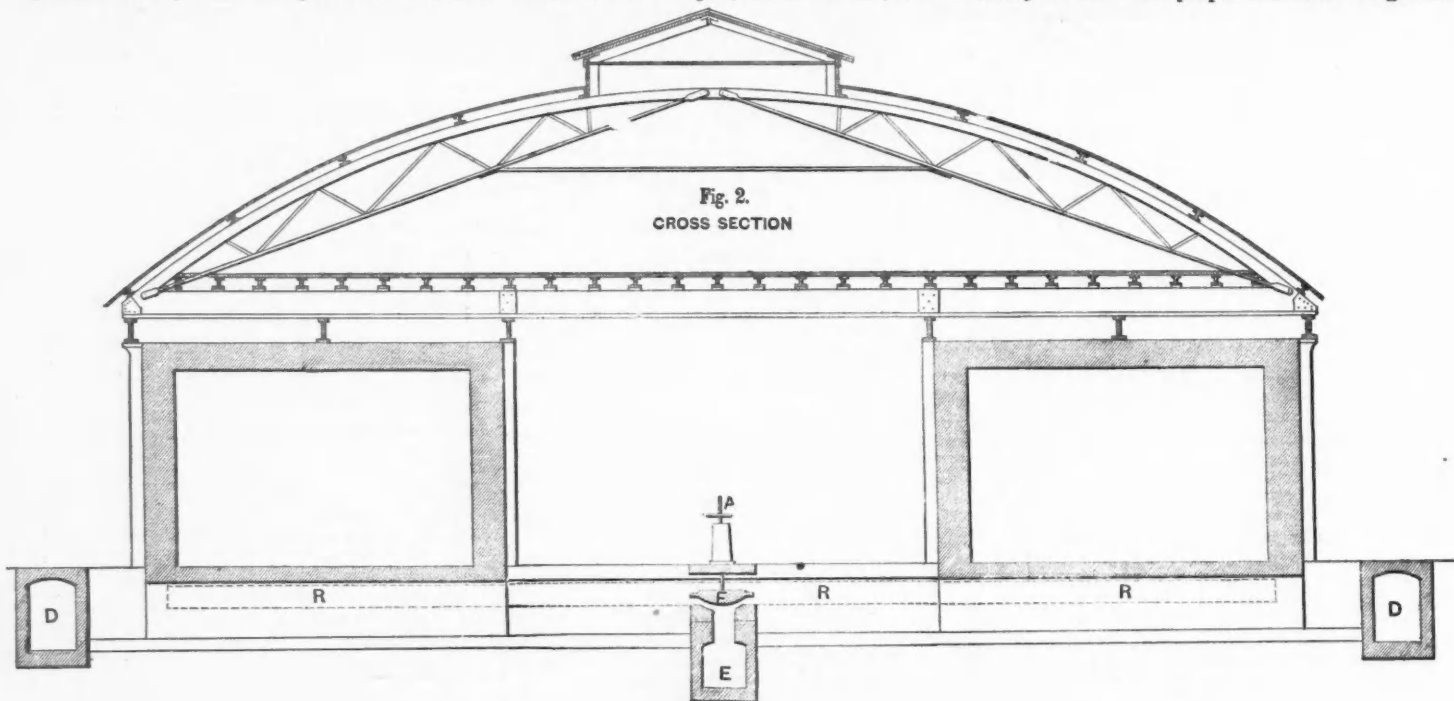
(Continued from page 24.)

The operation of preparing the bricks for firing consists, first, in the preliminary tempering on the floor above the kilns and in the space between them, so as to drive off sufficient water to permit the handling of the bricks. They still, however, contain a considerable quantity of moisture, and it would not be safe to subject them at once to a high heat, as there would be danger of their cracking and splitting. They are therefore charged into the kiln through the door *H*, and when the kiln is full, the door is closed hermetically by two rows of bricks laid up dry and plastered on the outside. Hot air from the burned-off kilns is turned into them, or, if this is not convenient, some gas from the producer, which is ignited so as to give a low and gradually rising temperature. During this time of steaming, the stoppers *d* are withdrawn from the openings in the roof, and the products from the heated bricks, charged with steam, are allowed to escape into the open air. The bricks are not heated to a high temperature until all this steam has escaped. During this time, the two passages *G* and *I* remain open. When the steaming is finished, they are closed. A chimney about 100 feet high is sufficient to produce the draught. Stronger draught may be produced by means of a blower. The gas leaves the producers at a temperature of from 600 to 800 degrees Fahr. It is passed into the chambers and there burned by the admission of air that has been highly heated by passing through two or three burned-off chambers that have been brought up to a high temperature, as high as the melting-point of steel. As the operation is continuous, we will suppose that chambers Nos. 3 and 4, Fig. 1, have been burned off. The gas from the producers is turned into chamber No. 5, which has just been steamed. Chamber No. 2 is open,

ing *I* in chamber No. 8. During very damp weather and in the winter, the heat of the chamber corresponding to No. 2 is made use of by introducing a square pipe into *K*, Fig. 8, and blowing cold air into the kiln. This pipe connects with another that carries the air thus heated to the drying-floors, thus utilizing the heat which would otherwise be lost, and cooling down the chamber at the same time. The main pipes are put up permanently, with branches leading to each chamber. The ends of these branches are closed when not in use. The movable pipe fits all the branches.

In the preliminary heating, which is called steaming, there is a very considerable quantity of moisture given off from the bricks, which moisture, as it is likely to absorb a large amount of heat, is allowed to escape from the openings in the roof *d*, Figs. 4, 6, and 7, the stoppers from which are removed for the purpose. This is done by introducing into these kilns a little producer gas, and burning it by means of cold air. All the air-ports and roof-vents remain open during the whole of this stage of the process, and are only closed when the chambers are ready to fire. As soon as the steam ceases to condense in each chamber, the openings are closed, so that none of the gas escapes. They are also used when it is desirable to cool a chamber quickly. The chamber No. 7 would in this instance be called a green chamber, since the bricks in it have not been burned. Behind it, there would be two—or as many as three—other chambers which were being cooled off, that is to say, 4, 3, and 2. The temperature in chamber 5 can be increased in from twenty-four to thirty-six hours up to a steel-melting heat, that is, to the stage of full firing. While this operation is going on, the next chamber in the series will receive the gases, so that the bricks in chamber 6 will be dried and brought nearly up to red heat. Into this, the heat would be passed, so that the operation would go on in the following chamber in exactly the same way.

In order to burn the brick successfully, a white heat is required. To maintain this, it is necessary to have the proper admixture of gas and



and, cooling off, the air is made to pass through Nos. 3 and 4, which are burned off and cooling down. No. 3 will then be red-hot, and No. 4 at a white heat. From No. 4, the air descends through the slits *a*, Fig. 5, into the flue *S*, Fig. 4, through the slits *i* to the flue *P*, and thence through the rectangular openings *m*, Fig. 5, which are regulated by flat plates of fire-brick *m*, Fig. 5, which are controlled from the outside by the slab *k*, through *I*, into the flue *O*. This flue is provided with openings *g*, which extend the whole width of the furnace, and are so calculated as to supply the exact quantity of air which is required for the perfect combustion of the gas. The rule in this respect is to make the capacity of the air-opening two and a half times that of the gas. The combustion commences a little below the level of the floor, and extends some distance above it. The air passes through these openings into the burner, where it meets the gas coming up from the flue *Q*. Chamber No. 5 is thus in full fire. It is filled with clear, bright flame. The products of combustion are made to pass through No. 6, which is called the benefit kiln, before going to the chimney. No. 6 is thus brought up to a bright-red heat, and, in its turn, when No. 5 is burned off, becomes the full fire-kiln by turning off the gas by the damper *A* and turning it on to No. 6. Nos. 7, 8, and 9 are in front filled with green brick in process of steaming; No. 9 is filling; No. 10 is ready for filling; and Nos. 1 and 2 are being emptied. Thus, all the operations are continuous: No. 2, open and being cooled off; No. 3, red-hot; No. 4, white-hot, both burned off and cooling; No. 5, burning in full fire; No. 6, in the preparatory stage to full fire; Nos. 7 and 8, steaming; No. 9, filling; No. 10, ready for filling; and No. 1, discharging.

When the gas is first turned on to No. 5, the chamber No. 2 will still be too hot to be discharged, and for the first five or six hours the air is made to pass through chambers 2, 3, and 4, to reach No. 5. After this time, the gain would be too small, so that No. 2 is cut off, although the bricks still retain considerable heat. This is done by shoving in the fire-brick slab *k*, which closes the opening *m*, so the air no longer passes them. The cold air is introduced by taking down the bricks that close the open-

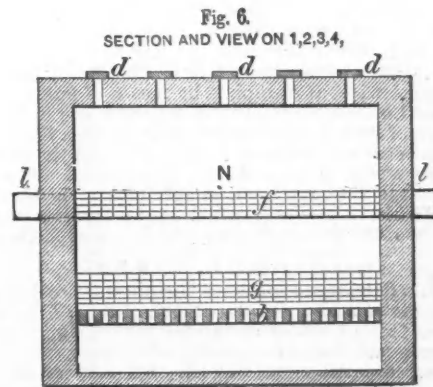
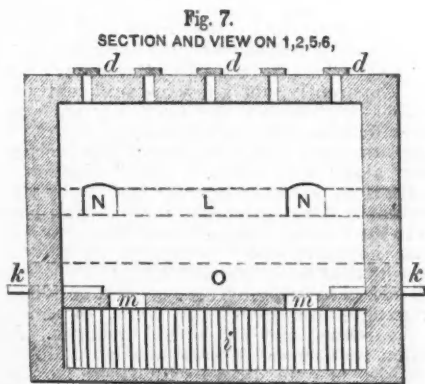
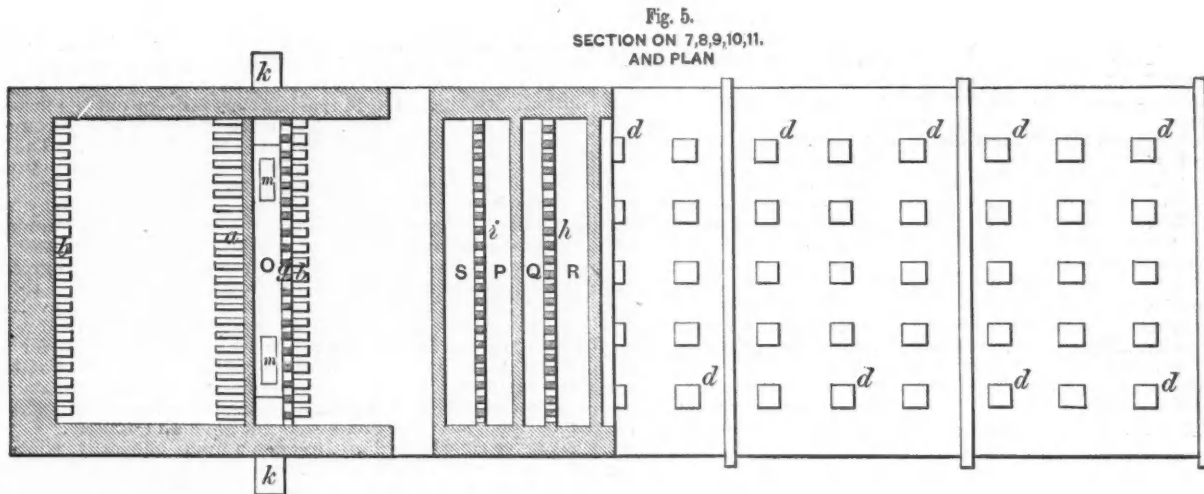
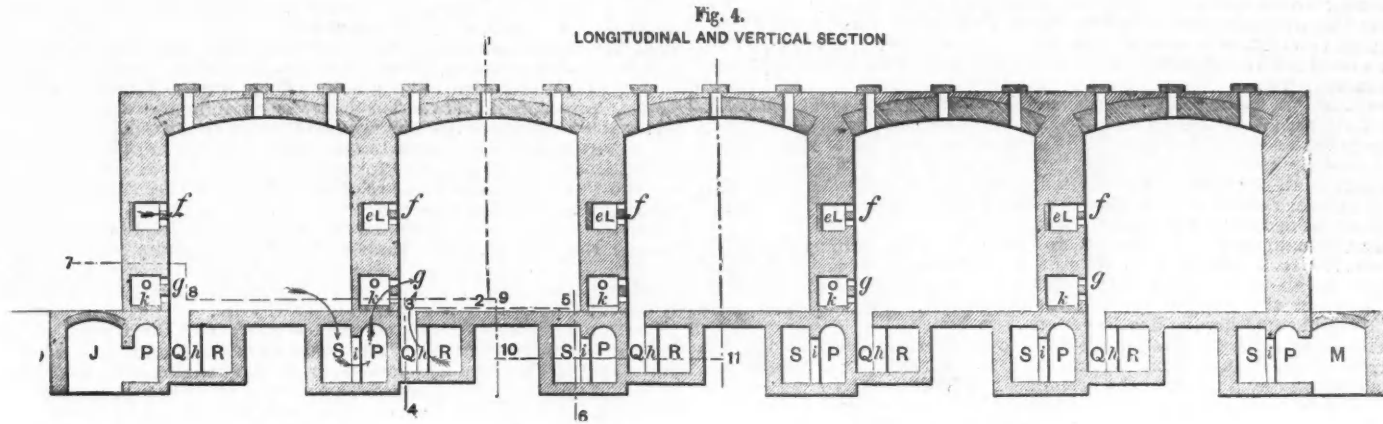
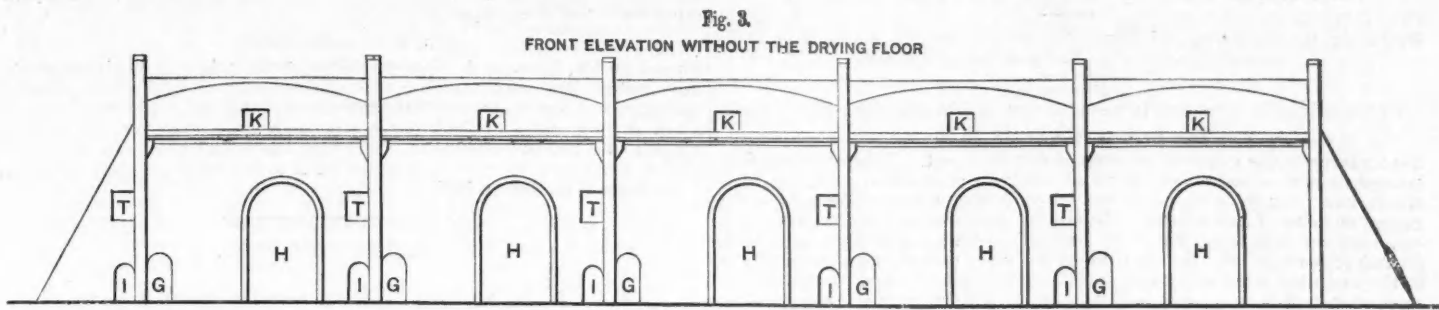
air, and to keep it at the proper temperature and under entire control. Without such control, it would be quite possible that the temperature upon one side of any one of the chambers might be sufficient to melt the bricks, and on the other not sufficient to burn them. It is for this reason that the flames are so divided in the underground channels, and that flues are made in the upper part as well as in the lower. Under these conditions, there is no danger of unequal heat, or that any ash or other material will be brought in with the gas, thus causing danger of fluxing the surfaces of the brick and making them rough. This kiln can be adapted to use for many other purposes besides that of making brick.

In the original design of this furnace, the idea was fully considered of having each chamber arranged in such a way as to be independent of its neighbor, and so that it could be used, skipping one, two, or three chambers, on either or both sides. But the expense of construction was so much increased, the complication of the flues so great, and the advantage to be derived from it so small, that the idea was finally abandoned without constructing any furnaces in this way. The wisdom of doing so has been fully confirmed by subsequent experience; for it has been found in actual practice that there is ample time between the burnings for the most serious repairs, which fortunately up to this time have not been required.

The result of this method of burning is a saving of from 50 to 75 per cent in the cost of manufacture. This saving is large, but not much larger than should be expected, and results, first, from the use of gas and regeneration; secondly, from economizing the heat in the preliminary stages by using the waste heat to bring the bricks up through the preliminary temperatures; thirdly, from the use of the radiated heat for drying the bricks. This last saving may be still further increased by extending the floor over the bricks 20 feet beyond the walls and all around them, which would greatly extend the drying space, and thus facilitate the work, and still further economize the heat. Such a construction would about double the capacity of the drying-floors above the kiln. The output of the kiln is, however, so large that some drying-stoves must always be used with it, as with every other kiln.

(TO BE CONCLUDED.)

* Abstract of a paper read before the American Institute of Mining Engineers, at the St. Louis Meeting, October, 1886.



THE DUNNACHIE KILN.

A, Gas-valves controlling the gas going to the kilns. B, Producers. C, Chimney-flues. D, Side-flues leading to chimney-flues. E, Main gas-flue. F, Gas-valves from main to the kilns. G, Opening admitting air to the floor of the kiln. H, Kiln-doors. I, Outside opening to hot-air flue O on the floor of the kiln. J, Flue connecting chambers 1 and 10. K, Spy-hole for the inspection of the kiln and for taking off hot air. L, Flue conveying hot or cold air to upper part of the kiln. M, Flue connecting chambers 5 and 6. N, Hot-air opening from one kiln to the other. O, Flue bringing hot air from kiln to burn gas in the next kiln. P, Underground flue bringing hot air to O. Q, Flue bringing gas from R into the kilns. R, Main gas-flue to kilns, a continuation of E. S, Lower flue for hot air. T, Outside opening into the flue L. a, Slits between the flues for passage of air. b, Openings for passage of gas. d, Slabs of fire-clay, closing openings in roof. c, Fire-clay slab, cutting off hot air from the flue L. f, Slits admitting hot and cold air from L to kiln. g, Slits admitting hot air against the gas. h, Slits regulating passage of gas from R to Q. i, Slits between P and S. k, Fire-clay slabs regulating the entry of hot air from P to Q.

THE SILVER MINES OF THUNDER BAY, LAKE SUPERIOR.

Written for the Engineering and Mining Journal by Robert Bell, B.A.Sc., M.D., LL.D.,
Assistant Director of the Geological Survey of Canada.

(Concluded from page 23.)

Of the mines in operation in the other groups in the Whitefish region,
THE RABBIT MOUNTAIN MINE

has undergone the greatest amount of development. This mine was first opened in 1883, when some very rich ore was extracted. Among that taken out near the surface, it was not uncommon to see pieces of silver glance the size of half a brick. Owing to disagreement among the owners, nothing was done in 1884, but mining was actively carried on during 1885 and 1886. At the time of my visit, operations were confined to the main lode, but a smaller parallel vein, about 50 feet to the northwest of it, had been opened, and upward of \$20,000 worth of silver taken from a slope near the surface. The outcrop of the veins occurs in a valley, on the sides of which the edges of the horizontal black slates may be seen, capped by the greenstone overflow. A mass of trap is brought, by a fault, into contact with the slates along part of the smaller vein. The main lode averages about 4 feet in width, although it varies from 2 to 20 feet, and consists of white calcspar with quartz, often in crystals, which are sometimes amethystine, lining vugs, together with a little purple and green fluor spar.

In addition to the solid gangue, much of what is considered vein-matter consists of the slate traversed in all directions with reticulating strings of the spar and quartz. The silver glance is associated with more or less of the sulphides of copper, iron, lead, and zinc. This character belongs to all the veins of the Whitefish region, and indeed to those cutting the black slates of the Thunder Bay District generally, so that it will not be necessary to repeat the description.

On the main vein at the Rabbit Mountain mine, the principal shaft is down 170 feet. At 80 feet, an adit is run northeast about 300 and southwest about 120 feet, and from this level cross-cuts have been driven to intersect the smaller vein to the northwest. There are two other shafts, and some stoping has been done.

The stamp-mill is built on a hill-side, so that, in treating the ore, it is carried by gravitation from one process to another, and the tailings are washed away by a brook at the bottom. It is built for two batteries of five stamps each, but only one is in operation, crushing ten tons a day. In flowing from the battery, the stamped rock is divided equally to two Frue vanners. The concentrates are barreled for export to Omaha, while the tailings pass to one or another of four tanks, from which, after settling, they are shoveled into two amalgamators. After treatment in these for five hours at a temperature of 150 degrees Fahr., the quicksilver is strained and the amalgam distilled and smelted into bricks of from 20 to upward of 50 pounds weight. A laboratory for assaying, etc., is attached to the works. The mill had been running for only two months, but there was ore enough on the surface for six months ahead, and the stock is increasing. Twelve tons of concentrates, worth about \$1000 a ton, had been shipped up to the time of my visit. Sixty-five men are employed, of whom twenty-two are miners, the rest being mechanics, laborers, etc. The property is owned by local men, but is worked under a lease by a St. Paul company. The manager is Captain McComber, formerly of St. Paul, who has been engaged in iron mining in the Marquette region and also in Hastings County, Canada. I was indebted to him for much courtesy.

THE BEAVER MINE

is on a vein of a character similar to that of the Rabbit Mountain mine, but running at right angles to it, or in a northwesterly direction. It cuts through a flat-topped ridge, 210 feet high, consisting of the horizontal black slates, with a capping of about 40 feet of greenstone. In the face of the hill, the vein shows a width of from 2 to 3 feet, but it is not so thick in the lowest level now worked. Three adits have been driven into the hill along the course of the vein. The lowest one just referred to is in 650 feet. At about 600 feet from the entrance, a small lead crosses the adit vein, and this has been followed for 40 feet to the northeast, and a winze is sinking upon it at this distance, which shows rich ore, and it increases in going down. The ore is mostly in the form of leaf argente, associated with blende. The two upper adits are not in so far as the third, but a good show of vein-stuff has been thrown out of them. An air-shaft is sinking on the south side of the ridge, to intersect the lowest level. The mill, which was almost ready to begin work at the time of my visit, is built on the bank of Silver Creek, a quarter of a mile south of the mine, from which the ore will be brought by a tramway. The ore is to be reduced without stamping, by means of pulverizers, one of which is Frisbee & Lucop's patent. The reduced ore will be separated by means of two of Frue's vanners and one "Golden Gate" vanner.

Seventy men are employed in connection with the mill and the mining operations, of whom 18 are miners. Compressed air-drills, worked by a 60 horse-power engine, are used. Captain Crow is manager of the mine, and F. S. Kirkland is the general agent for the property, which is owned and worked by Mr. Peters, of Manistee, Michigan. The vein at

THE PORCUPINE MINE

cuts through a flat-topped hill with the normal northeasterly bearing of the veins of the country. On the northeast side of the hill, the vein consists of three feet of mixed slate and reticulating veinlets of spar and quartz, showing a little silver glance, with the same sulphides as in the other mines. A shaft is sinking on this side of the hill, which was down between 50 and 60 feet. But the principal workings at this mine are on the southwest side of the hill, and consist of four adits driven rather too closely together along the course of the vein, with stopes between them. The second from the bottom is the longest, and is in about 300 feet; the lowest is in 100 feet; while the upper ones are in 50 and 40 feet respectively. The vein averages 3 feet in thickness, and is of the same composition and reticulated character as those of the other mines, and carries the same sulphides, together with a good show of argentite and some native silver.

No mill has yet been erected, but several hundred tons of promising looking ore have been separated out, and the silver-house is well stored with rich specimens. Only a few miners were employed at the time of

my visit. Captain Angus McPhee, of Rabbit Mountain P.O., is the principal owner of this property.

THE LITTLE PIG MINE,

owned by Mr. Thomas A. Keefer, of Port Arthur, is only beginning to be developed. The vein, which consists principally of coarsely crystalline calcspar, is 4 feet wide, and runs northeast along the northwest base of a hill of the horizontal black slates, which are here, as at the other mines, capped by a bed of greenstone. The vein has been uncovered in several places, and two cross-cuts with short adits to the right and left in one of them have been driven into it.

THE GOGEBIC IRON MINES.

Written for the Engineering and Mining Journal by Prof. C. D. Lawton.

I have just returned here from a hasty trip along the Gogebic range. I drove across from here through the woods fifty miles to Watersmeet, and took a train to Hurley, and visited every exploration and mine along the range. It is a remarkable section in many respects. The development is wonderful, considering the time that has elapsed since the country was first opened. There are some excellent mines, prominent among which, or rather chief among which, are the Montreal-Ashland, Norrie, Aurora, and Colby. The latter is an immense deposit. One is better able to judge of it now than he could six months ago. Now, they have drifted and cross-cutted in it underground. In this manner, the south deposit has been opened for a length of 1200 feet east and west, and shows a width of choice ore of from 120 to 140 feet from foot-wall to hanging. The depth is about 100 feet. Their plan of mining is to ultimately let in the surface and capping of rock, and leave the mine open to the surface, using timber only for temporary purposes, or to secure some necessary drifts and "rock mills."

The ore mines easily, costing but \$1.50 per foot to carry a drift 9 feet by 9 feet; that is, they pay that to break the ore.

The north deposit—300 feet on surface north from the former—is also looking well. I previously visited the mine in August last, at which time a crossing of rock had come in from the hanging-wall, and, apparently, cut out the ore. However, a cross-cut to the south, into the foot-wall, developed the existence of the ore-body to a width of 90 feet south. It also continues east in great amplitude. It is an important fact connected with the south deposit, that it has widened greatly, mainly to the north, in the direction of the other deposit. That is, the ore-body is wider in the present bottom of the mine than it was above, and this is true of the whole length of the mine.

These facts have had much influence, no doubt, in booming this range. But besides the Colby, there are other good mines; none with so great an amount of ore in sight, to be sure, but enough to insure a large output. Of these, the Norrie has thus far sent out the most ore, ranking second only to the Colby. The mine is wholly underground, mined out in rooms that are timbered after the Nevada system. The underground workings are 855 feet maximum length, with a maximum width of 160 feet, and depth from surface of 175 feet. Its ability to supply the demand for ore is, apparently, as good as ever. That is to say, every thing is favorable at the Norrie—no cause for concern. Its immediate neighbors, the Ashland on the west, and the Aurora on the east, afford equal promise; in fact, as to these latter, their condition has greatly improved. The deposits of ore in each are showing much larger in the bottom than they did in the upper levels. However, we did not have the time for a very extended examination, but sufficient to be satisfied regarding some leading facts. Nearly the entire length of the range for a distance of twenty miles is dotted with so-called mines. Most of them are thus far merely explorations, mere beginnings, where they have either not yet reached the ledge with their sinking, or have not succeeded in finding ore. Some have got ore, but as yet in small quantity.

It takes time to find ore, to open a mine, generally, where there are no exposures, every thing covered up with thirty feet of drift. Such work of development is slow, expensive, and uncertain; but unfortunately, or fortunately, according to the way one looks at the matter, as his interest lies, zeal for investment does not seem to be dependent on any such tedious process. Mining stocks here are bought and sold; parties—"tender-feet"—are eagerly seeking for opportunities to invest, and new locations are made, companies organized, and stocks issued to meet the demand. Not infrequently, there is nothing apparent but the fact that the land is on the "range," and is crossed by the ore formation—imagination does the rest. Apparently, not a few are sufficiently endowed with this faculty to see in fancy beneath the overlying surface magnificent deposits of ore, of which the Colby is but a counterpart. But there is undoubtedly much to keep up this hope; discoveries of ore are constantly making along the range. The formation is far more regular here than are those in the Marquette and in the Menominee iron districts, which makes exploration a much more easy and certain matter. The ore formation in the Gogebic range lies—at least, for some distance—between the trap on the north and the granite on the south, dipping north, and the deposits thus far discovered seem to be between a so-called quartzite foot and a slate hanging. There is great activity in the region, in investment, in exploration, in mining work, in railroad building, in the growth of the towns, and in general business. An important matter is the fact that the Chicago & Northwestern Railroad Company, with its usual enterprise, is extending its line from Iron River, on the Menominee range, to the Gogebic mines, intersecting the Milwaukee, Lake Shore & Western line, which now has all the carrying trade at Watersmeet. The distance from Iron River to Watersmeet by the new route is thirty-four miles. This road, which will be completed next summer, will afford the Gogebic range mines an outlet for shipping ore to Escanaba on Lake Michigan.

The villages of Bessemer, Ironwood, and Hurley, the most considerable towns on this range, show a great deal of prosperity. The latter has a fine hotel, where the traveler will find the best of accommodation; and although the town has received a good deal of attention through the papers recently that has given it an unenviable notoriety, one sees only, outwardly, a great deal of activity and apparent prosperity, with such

mingling of the debasing elements as most usually pertains to mining towns. I was accompanied on my trip by Mr. J. N. Porter, Superintendent of the Iron River Company, and Mr. F. P. Mills, of the Union Steel Company, Chicago. I shall return to the Gogebic range soon to give the mines, etc., a more careful examination.

STAMBAUGH, MICH., JAN. 6

ELECTRIC WELDING.

A new and extremely important application of the heat evolved by electricity has lately been perfected by Professor Thomson, of the Thomson-Houston Electric Company, in his process of electric welding. Heretofore, only comparatively few metals could be successfully welded by ordinary furnace heat and hammering. These metals were wrought-iron, steel, platinum, pure gold, and perhaps a few others. On the other hand, cast-iron, brass, bronze, silver, tin, zinc, lead, and other metals and alloys could not be welded, but required special soldering. Even the welding of copper, while not impossible, has always been so difficult as to be seldom successful. All this is now changed by the introduction of electrical welding. Some of the metals that it was before impossible to weld become those most easily dealt with. Copper, says the *Electrical World*, becomes remarkable for the facility with which joints are made when the proper temperature is reached. Iron, steel, platinum, and like metals, formerly known as weldable, are united electrically with great ease and certainty. Thus far, pieces of all the metals tried have welded to other pieces of the same metal. When, however, the pieces are of different metals or alloys, failure may result from too great differences, either in their temperatures of softening or in their specific electrical and heat conductivities.

THE BACON DOUBLE-CYLINDER HOISTING-ENGINE.

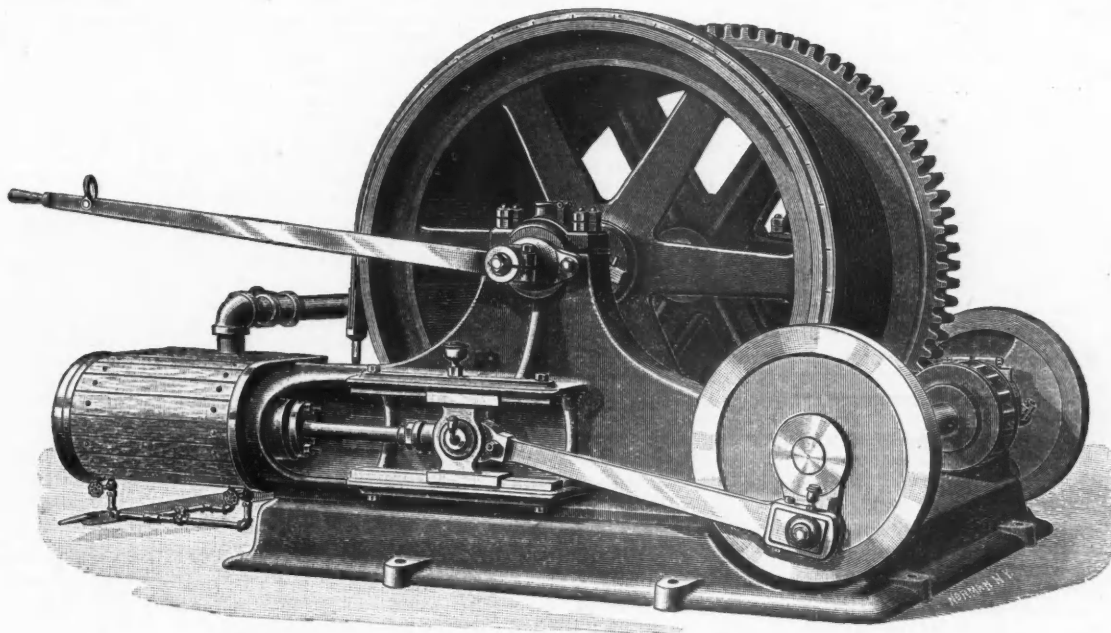
One of the most important elements of economy about a mine is a hoisting-engine—one that is simple and strong in design and construction, so as to be easily taken care of, and not liable to get out of order; that has an abundance of power, and to spare, for any possible work it may have to do; and that is economical in the use of steam. The best way to be certain to get these qualities is to purchase from a reliable manufacturer.

We illustrate herewith a very convenient and popular form of hoisting-engine, made by Messrs. Copeland & Bacon. The cylinders and drum are so connected that the foundations can be comparatively light. The drums are usually worked with friction, the engine running with automatic cut-off, so that the steam may be economized, and the cars lowered by a brake on the drum. It is unnecessary to say that the workmanship is excellent, the engine simple, strong, efficient, and economical. So many are now in use that no one need have any difficulty in ascertaining the facts from those who use them. Messrs. Copeland & Bacon's address will be found in our advertising columns; and by addressing them, fuller information can be obtained.

COLORADO MINING ITEMS.

Special Correspondence of the Engineering and Mining Journal.

A recent trip to the upper end of Boulder County has convinced me that the miners have at last learned that the best way to get money out of their mines is to work them. For a long time, it was the dream of many that they could sell their undeveloped prospects for the price of mines, and at one stroke make a fortune. The fact that the prospects could not be sold finally dawned upon them, and they tried the plan of working



THE BACON DOUBLE-CYLINDER HOISTING-ENGINE.

The method of electric welding may be briefly stated to consist in forcibly pressing together the bars or other pieces to be joined or welded, and then passing an electric current of large volume through the pieces, a small portion of the bars on each side of the place of abutment serving as a path for the current. The resistance at the meeting-point of the abutted bars gives rise to a welding heat at this point, and the pressure causes a thorough union, with generally an expansion at the union, due to the approach of the pieces under pressure. The process is evidently a simple one.

One of the most evident applications is in joining, end to end, wires of copper and iron for various purposes, such as in forming coils of magnets, and in telegraph, telephone, and electric line construction, thus avoiding the existence of clumsy and resisting joints.

There is no reason why very heavy bars may not be operated upon by using sufficiently large and powerful apparatus. The largest diameter of copper rod thus far welded measures nearly seven sixteenths of an inch, and of steel nearly seven eighths of an inch in diameter, and so far as can be determined by estimation alone, this required a current of over 20,000 amperes. This is probably a much larger current than has heretofore been produced in any single conductor or machine. The difference between the sizes of iron and copper welded by equal currents is due to the smaller resistance of the copper and the greater facility with which it conducts heat away from the junction during the operation.

Another obvious use of the new welding process is in the butt-welding of metal tubes or pipes. For high pressures of steam, air, or gas, such a system would seem to be desirable. Long iron pipes are now very laboriously made from short lengths for bending into coils containing from 100 to 1000 feet. The electric weld would render such an operation easy.

In fact, the applications of this process appear almost without limit, provided the actual cost for power expended be not too excessive. Professor Thomson estimates that, to weld a bar of steel 1½ inches diameter, it would require an expenditure of about thirty-five horse-power for less than one minute, which would certainly not exceed, or even reach, the cost of doing the same work at a forge fire.

them. So far, their efforts have been attended with success, and some of the men are making, slowly but steadily, the fortunes they hope for. At Ward, work is going on in six mines, and, I am informed, successfully in all. Some I know are doing exceptionally well. The ore, which is rather low-grade, occurs in large bodies, and, at present prices, can be mined at a profit that was impossible a few years ago. Reduced freights and smelting charges have combined to make every ton of ore shipped worth from fifteen to twenty-five dollars more than it was worth six years ago.

As a result of the successful work now doing, prospects that were abandoned for years have been relocated; old mines are unwatered; and altogether, there is an air of bustle and prosperity to which the camp has long been a stranger.

To Mr. W. W. Hulings, more than to any other man, is due the credit for the improved condition of affairs. He demonstrated by his work on the Columbia that, at present prices, the ores of the district could be mined at a profit; and in doing so, overcame obstacles that would have been insurmountable to a man with less courage and tenacity of purpose. Col. Wesley Brainard, President of the Chicago & Colorado Mining Company, has also shown his faith by his works; and if his reward is as great as his deserts, he will be well provided for.

At Gold Hill, there is considerable activity, and the measure of success is large. A strike of importance in the Cold Spring is reported to-day by the owner, Mr. Whitcomb.

The Slide is doing well, though the force has been somewhat reduced pending a transfer of the property, which is reported sold for \$750,000.

The White Crow, at Sunshine, which was leased and bonded to Dr. Earhart, Mr. Williams, and Mr. Neikirk, has been paid for, a good plant of machinery put on the property, and a comfortable dividend declared. All this from the profits of four months' work.

The Belcher mine, at Caribou, was leased and bonded by Colonel Ellet, the owner, to the Irwin Brothers for \$10,000. The mine is now in bonanza, and the original owner has taken the property back under bond for six times the amount of the original bond.

Work has been started on the Caribou, and it is confidently expected

that this old mine will again enter the list of producers. As soon as the water is out, a number of other mines in the immediate vicinity will be able to resume work.

From Clear Creek County, comes the report that the Stanton Engineering Company has "gone to pieces," and that its property (machinery) is offered for sale by the mortgagees. I am also informed that the Baltimore Tunnel Mining Company's mines are in borrasca.

I note your allusion in the JOURNAL to the prices now paid for Bassick, Amie, and Red Elephant stock, and to the heavy dealing therein. To-day, these stocks do not represent any thing, and have no more intrinsic value than so much waste paper.

A year ago, Red Elephant, with a bonded indebtedness of about fifteen thousand dollars, was selling for two cents a share, or ten thousand dollars for the mine—an amount far below the value of the machinery. Now that the property has been sold out by the sheriff, and the stock "wiped out," it sells at prices that range all the way from four to ten cents a share. Can you explain why these things are so?

There seems to be quite a demand for good mines, especially gold mines. But the market will doubtless be ruined by the promoters of "wild-cat" enterprises. If the laws only sanctioned the killing of those fellows, what a blessing it would be to the country!

H. F.
DENVER, COLO., JAN. 3.

NOVA SCOTIA GOLD MINING NOTES.

Correspondence of the Engineering and Mining Journal.

Your readers in the States may be interested in learning something of the growth of mining interests in this part of Nova Scotia.

Work was begun here in June, 1886, and we have now four shafts of an average depth of seventy feet on a vein varying in width from fifteen to twenty-four inches.

Three hundred and fifty tons of ore have been hauled from here to our ten-stamp mill at Pleasant River, seven miles away, which has produced seven hundred ounces of bullion eight hundred fine.

Our new mill here at the mine is finished, and we began running on New Year's day. The motive power is a forty-five horse-power engine, which drives ten stamps, a Blake ore-breaker, automatic fuel, Monitor concentrator, three hoists, a mine pump, ore-car, pumps, etc.

The mill is a three-story building; the ore being taken into the third story on an inclined tramway, which connects with tracks from each shaft-house. It is then put through a screen, and the coarse ore run through the breaker. From the bin, the ore is fed automatically to the stamps without further handling, making on the whole a small but complete plant.

Yours, etc.,
BROOKFIELD GOLD MINES, NORTH BROOKFIELD,
NOVA SCOTIA, JAN. 7.

JOHN MCGURRE, Manager.

THE COAL MINES OF GERMANY.

Among the British Foreign Office reports just issued, is one on the trade of Düsseldorf and district, and incidentally the local coal industry is dealt with. It is stated that recently considerable advances have been made in this trade, especially in the pumping-engines and appliances necessary for dealing with large feeders of water, both in shaft sinking and in mining operations, in coal-washing and screening apparatus, in the application of mechanical means for ventilating purposes, in winding-engines and machinery generally, in improvements in coke-ovens for the utilization of by-products in the manufacture of coke, and in some few cases in the manufacture of patent fuel. Little progress has, however, been made in the application of mechanical means for underground haulage; this work is still, at least in the Dortmund District, as a rule effected in the old way by two men and horses, it being now very generally the custom to have the horses and ponies supplied and fed by contractors at a certain rate per ton of coal and haulage distance. In many cases, the surface damages, even in those of mines of considerable depth, have become so heavy—in consequence of the number of seams worked, and therefore great thickness of coal extracted from the bowels of the earth, the amount of floor-stone excavated in the main ways, the number of cross-cuts and stone drifts tunneled—that the mining engineers at some collieries have reluctantly been obliged to adopt the system of refilling the vacancies thus created, as far as possible, with the waste stone and shale, and even running down stuff from the accumulated heap at the surface for that purpose. By suitable appliances, the cost of the production of the coal has not been much increased by the adoption of this system, whereas great reduction in the amount of surface damages has resulted, or may with confidence be expected in the future to result therefrom. The adoption of this system has become particularly necessary where a number of flat-lying seams are worked. There have been cases where the claims for surface damages were so heavy that the colliery owner found it cheaper to buy the land and buildings than to pay the damages.

The government mining inspection restrictions as to the working of coal under towns, railroads, etc., cause considerable losses to the coal-owners, without in any way diminishing the danger—rather tending to increase it by causing vertical rents or clefts in the chalk marl right up to the surface, instead of a gradual sinking of the earth's surface. With regard to the prescription of mechanical instead of furnace ventilation—although still an open question which is the better system—the rules and regulations as to the thickness of steel and iron winding ropes and other details are often complained of as an unnecessary interference in mining engineering, calculated to cramp its development; and this is considered hardly fair, seeing that the colliery manager is held personally responsible to the government mining board in case of accident, and that the coal-owner is bound by law to pay compensation and to contribute to the insurance of the miners against illness and accidents. Where, however, the colliery management is good, there is not much cause to complain of the government supervision, and in cases of accident the only inquiry held is by the government inspector, or, in exceptionally serious cases, by

the government mining board. Notwithstanding the bad times, a few new coal, ventilating, and pumping shafts have been and are sinking; some new collieries have been opened out, and others that had been accidentally drowned out have been drained and set to work again. In some cases, this has been done with a lavish expenditure of capital, and if any thing, it is stated, "a little too much on the broad gauge," particularly over ground where no amount of experience can cure the Westphalian coal mining engineer of his love for bricks and mortar and gigantic polished engines. The opinion is expressed that this accounts to a certain extent for so many of the Rhenish-Westphalian collieries being so heavily handicapped in the matter of capital. At any rate, taking the general average of a number of years, the low rate of dividends in the Dortmund District, compared with the results in the north of England mining district, can not be attributed to any want of generosity on the part of nature in her apportionment of quantity or quality of coal to the former district, nor has the nature of the coal measures or any angle or dip of the coal-seams much to do with the question, since experience in the German mining locality under notice goes to prove that steep seams are easier to ventilate and open out for large production, and are cheaper to work, than flat-lying seams.

An interesting series of papers and tabular statements are now publishing in Germany, wherein the author seeks to explain where the water comes from that is met with in the coal mines. Considering, however, the geological construction of the greater parts of the coal-fields not worked, it seems useless to try and account for the water by any comparison of the rain-fall in the district with the amount of water pumped out of the mines (as is obviously the object of the author referred to), on the supposition that the surface water, or at least a large portion of it, filters down from the surface directly into the coal measures. Where the latter lie high, along the valley of the Ruhr, great quantities of surface and river water certainly enter the coal measures, as also farther to the dip, where the chalk marl is laid on non-conformably to the coal measures, through the clefts and partings that took place in its settlement; but except where such horizontal and vertical partings are met with, this formation is perfectly dense and impervious to water. In many cases, 70, 80, 100, and more fathoms of dry chalk marl have been sunk through before the coal measures were reached, in which latter strata, subsequently in coal work, water feeders up to 300 and 500 cubic feet per minute broke into the mine. In the return of 114 collieries to the right of the river Ruhr, that is, toward the dip of the coal measures, which, to a great extent, are covered by a great thickness of chalk marl, the total amount of influx of water into the mine is given at 215 cubic meters, equal to 281,225 cubic yards per minute, a small portion of which is drained off by adits, the remainder pumped to surface from a mean depth of 266.45 meters, equal to 291,406 yards. The pumping-engines employed have together 12,770 horse-power. The quantity of water is calculated by the theoretical working effect of the pumps and engines employed. There does not, however, appear to be a regular system of registering the effective, or supposed to be effective, pump strokes; therefore, this estimate is likely to be much in excess of the actual quantity. The largest quantity pumped at any one colliery is given at 10 cubic meters per minute, equal to 13.08 cubic yards.

Some time ago, a congress of government and private engineers was held at Düsseldorf, at which this and numerous other technical mining questions were discussed. Complaints were made at the meetings against the government mining authorities, to the effect that the present deplorable state of the coal industry and trade is in a great measure attributable to the want of assistance and support by those authorities in meeting the wishes and carrying out the proposals of the mine-owners and their associations: as to the construction of the Rhine-Elbe Canal, for the promotion of which work they have been uninterruptedly agitating for nearly thirty years; as to the reduction of railroad freights, especially to the North Sea ports, in which respect they had been more fairly met by the Dutch than by the German railroads, in consequence of which 90 per cent of the consumption in Holland is now supplied by the Rhenish-Westphalian coal district; and as to the reduction of the ever increasing local and other taxation of even such collieries as are working at a dead loss, as well as to the surface damages and mine-water discharge questions. The defense endeavored to be made for the government representatives was to the effect that the present state of the coal trade was chiefly caused by the excessive competition among the colliery owners themselves, and suggested that the best remedy would be to adopt the mining laws and customs of thirty years ago, when the government authorities decided what collieries should be worked, what quantities produced, as well as even what class and number of men should be employed, forgetting, it would appear, the change of circumstances, the requirements of the present day as compared with that period, the enormous advances made in the science and development of mining, and the experience gained. It is needless to say that the mine-owners and associations have not the least inclination to sacrifice the freedom and advancement gained by so many years of hard work and untiring energy by the adoption of such a retrograde movement. So far, the land-owners have had the best of it, and the mine-owners are obliged to spend large sums of money in the deepening and regulation not only of the water-courses, but may in future be obliged to regulate the rivers, so that, in some cases, as the cheaper solution of the question, they prefer to purchase the land, as in the case of surface damages. The landed proprietors and noblemen are, as a rule, not unfavorable to the promotion of industry, and take advantage of every point of law to come down heavy on the colliery owner, on whom they and the communities levy the maximum rates and community taxes, throwing difficulties in the way of their building workmen's houses, etc., so that it is to be assumed if the coal were the property of the land-owner, little indeed would be produced. There are exceptions where the nobility, for instance, in Westphalia—the Rombergs and Metternichs—have done much to promote industry. Still, notwithstanding all these difficulties, it is stated that the Rhenish-Westphalian coal district has a great future before it, and there are now, where things are at or near their worst, favorable openings for the investment of English capital in coal mining, by English companies under English management in Germany under German law; but the managers should be men who can adapt themselves to the circumstances of the country.

Owing to continued and further depression in coal and coke prices, notwithstanding the small increase in the total amount of production in the Dortmund District—28,970,568 tons in 1885, as compared with 28,403,258 tons in 1884—and a fair demand, and every endeavor made to hold ground against reduction of prices (and, it is to be presumed, a fair amount of attention to economy in cost of production), the working results in 1885 have been worse than in 1884, and, so far, it would appear, still worse this year, allowing even for the fact that in the spring and summer the trade is invariably dull, compared with the fall and winter. As far as the weather was concerned, things were very favorable for household coal last winter and spring. The direct cause of the further depression is mainly to be attributed to the depressed state of the iron trade and the low prices in England. None but the best situated and managed collieries has returned, or is returning, any thing like a fair profit; the larger number are worked without any profit, and a considerable number at a dead loss. The losses of joint-stock companies have to be covered by bankers' credits or issue of obligations; those of the private or partnership companies also by loans or calls on the partners, whose means or patience in many cases are well-nigh exhausted. Still the collieries are generally working full time, though not full speed; wages are fairly maintained; and there would not appear to be any very marked want of employment, nor have we heard of any colliery having been laid in merely in consequence of reduced prices.

German-Belgian Steel Rail Combination.—The German iron-masters have made an agreement with those of Belgium to refrain from selling rails in each other's country. The iron-masters of both countries are endeavoring to induce the English manufacturers of rails to enter into a similar agreement.

Greek Duties.—The Greek government has increased all duties 20 per cent, in future to be paid in gold. The paper money of the states belonging to the Latin Union will be accepted, but at a reduction of 15 per cent.

Chili Saltpeter.—An Iquique, Chili, report states that a mine belonging to the Association Salitrera has produced and sold 100,000 quintals more saltpeter than fell to it according to the regulations of the convention. As a consequence, a penalty of 226,000 pesos is claimed.

Railroads can not Operate Mines.—The Supreme Court has reversed the decision of the lower court of Jefferson County, Pa., in the case of the Attorney-General vs. the New York, Lake Erie & Western Railroad Company and the Northwestern Mining and Exchange Company. The decision expressly defines why, under the constitution, railroads can not operate coal mines. A new trial has been awarded in the case.

The German Strontianite Industry.—Kuhlow's says that this industry is looking up. An Ahlen correspondent represents it as having experienced a revival. Orders for ore have of late been received in large number, as many sugar manufactories have adopted the strontianite method of saccharizing molasses. Recently a long-pending trial in which the Strontianit-Societät sued the Breslauer Zuckerfabrik for damages was settled, the latter concern having to pay to the Strontianit-Societät a convention penalty of 300,000 marks.

Trinidad Asphalt.—It is reported, in connection with the great wealth that lies in the Pitch Lake of Trinidad, that the former monopoly of "digging" the asphalt has been brought to an end, and licenses are now offered openly by the government at a royalty of 2s. 6d. a ton. It is expected that this course of action will largely increase the asphalt trade. The exports of crude asphalt for the years 1883-84-85 were respectively 34,277 tons, 33,383 tons, and 28,505 tons; thus showing a decrease. In boiled asphalt, however, an increase has taken place, the figures for the same years being respectively 4868, 6562, and 6371 tons.

Silver Imported through El Paso, Texas.—The importation of Mexican ore into the customs district of El Paso is constantly increasing. For the month of December, 1886, the quantity of silver ore thus imported was 723,000 pounds, or an average of 162 tons for each day. One thousand tons came from Nogales. The importation of Mexican dollars is also steadily increasing. For the month of December it was over \$1,200,000. The most of the Mexican ore is imported as silver ore, free, but it contains a large amount of lead; this is, therefore, a convenient way of getting the lead in free also.

Combination for the German Potash Trade.—The potash trade has suffered seriously by the fall in prices during the last few years, and it is not surprising to see that potash manufacturers are bestirring themselves with the view of improving their circumstances. A potash combination has been concluded comprehending, according to Kuhlow's, all home firms with the exception of that of Carl Heintz, of Stettin. The object of the convention is not to increase potash prices excessively to the detriment of the public, but so that adequate profits may be again realized. For the purpose of meeting the peculiar circumstances of all districts—as dependent on geographical position, etc.—the association has been divided into two groups, an eastern and a western group, the former of which has chosen Berlin as the seat of its sale syndicate.

The German Potash Trade.—The production of chloride of potash in Germany for 1886 is announced at 1,923,994 centners, to which stocks at the beginning of the year must be added, namely, 103,737 centners, in order to get at the quantity for sale, namely, 2,027,731 centners. The sales amounted to 2,041,849 centners up to November 30th (though, of course, all had not been delivered), so that the sales of 1886 will be considerably exceeded this year. Orders for about 300,000 centners of goods of high percentage have arrived from America, and a large spring demand may be counted on from that country. The syndicate has placed the debit of chloride of potash solely in the hands of the general agent in New York, and it is expected that the trade will in this way be considerably increased. The industry is at present in a very gratifying position

Economy in Firing Up Anthracite-Burning Locomotives.—C. G. Steffe, of Reading, traveling engineer of the Philadelphia & Reading Railroad Company, has brought to a successful conclusion a series of experiments for retaining the fires in the large locomotives of the company instead of drawing them at the end of each trip. The firemen now sprinkle their fires with a small quantity of soft coal or coke, whereby the fires are kept in good shape until the engines are needed. Heretofore, it has been necessary to keep a large quantity of wood on hand, and a number of men were employed in looking after the fires. The new mode will be put in force at once on the main line of the Reading Railroad and branches, and it is estimated that the change will effect a saving of many thousands of dollars annually.

A Dynamometer Applied to Slide-Valves.—The mechanical department of the Chicago, Burlington & Quincy road is using a most ingeniously devised dynamometer, which it has invented, or rather developed from a defective invention for testing the power required to move slide-valves. A small hydraulic ram is employed, which fits on the standard valve-stem. A head of water for the ram is carried in a vessel fastened to the sand-box. The intensity and variation of pressure are recorded on the paper-covered drum of an ordinary engine-indicator. The intention is, to demonstrate by the use of this instrument the percentage of power required to move different kinds of valves under the varying conditions they are subjected to in service. This provides an excellent means of testing the exact value of balanced as compared with the unbalanced valves, and of sight continuous feed lubricators for locomotive cylinders; and we understand the intention is to make the experiments necessary to do so. The movement of this dynamometer is so delicate that the valve-stem is only lengthened or shortened $\frac{1}{8}$ inch for the heaviest tests.

Photography of Invisible Objects.—Mr. Ch. Zenger has lately made an interesting communication to the Académie des Sciences that discloses new means for the photographic study of the stars, while waiting other scientific applications. The author has been struck by the phenomenon that the summit of Mont Blanc retained after sunset until half-past ten a phosphorescent bluish appearance, which he thought it possible to utilize for obtaining a photograph of the mountain. For this purpose, he projected, by means of a photographic camera, the image on a plate covered with a layer of Balmain's luminous paints. After an exposure of a few seconds, this plate was held in contact in the dark with a dry photographic plate, and at the end of an hour the image of the mountain was obtained complete with all details, as if taken in the ordinary way. This result permitted conclusions to be drawn that the carbonate of lime exposed during the day to a brilliant sunshine emitted during the night invisible but very actinic rays. Experiments were made at Prague, where very fair photographs of the buildings surrounding the observatory were obtained during night-time, which seems to confirm the theory that light can be absorbed and slowly re-emitted, and that the images of invisible objects can be fixed in the darkness by means of actinic rays. This new process will, no doubt, be of service in the preparation of astronomical maps, but can be applied to other things. Ordinary paper also possesses the property of returning light, and when impregnated with a fluorescent solution, such as nitrate of uranium, latent pictures can be obtained, which can be developed months afterward, if they have been preserved in the dark in perfectly dry air. Mr. Zenger has studied this subject for more than two years and has succeeded in preparing plates sensitive to all the radiations of the solar spectrum, from ultra-violet to ultra-red. There can be little doubt that, by rendering the invisible rays visible through their photographic effects, many fresh revelations about the constitution of the universe and its component natural objects will be obtained.

BOOKS RECEIVED.

[In sending books for notice, will publishers, for their own sake and for that of book-buyers, give the retail price! These notices do not supersede review in another part of the Journal.]

A Glossary of Scotch Mining Terms. Compiled by James Barrowman, Mining Engineer, Secretary to the Mining Institute of Scotland. 1886. Hamilton: Printed at the "Advertiser" office, by W. Naismith. 8vo, pages 74, 20 illustrations; limp covers. (Price unknown.)

It has been the aim of the compiler to bring together all mining terms that have been and are in common use in the stratified mines in Scotland. No attempt has been made to include the names of parts of machinery, and other engineering terms, which, although well known in Scotland, are not peculiar to that country. Most of the terms are known and used over Scotland; some are confined to one or two districts; and a few are local.

PATENTS GRANTED BY THE UNITED STATES PATENT-OFFICE.

GRANTED DECEMBER 28TH, 1886.

- 35 222. Apparatus for Desulphurizing Ores. Frederick Sibley, New York City.
- 355,274. Manufacture of Compound Plates. Robert P. Manly, Radnor, and Frank H. Taylor, Philadelphia, Pa., Assignors to the Manly & Cooper Manufacturing Company of Pennsylvania.
- 355,278. Rock-Drill. Powell Rader, Georgetown, Texas.
- 355,279. Machine for Dressing Slate. Francis Shenton, Slatedale, Pa., Assignor to Mary Howard Shenton, same place.
- 355,284. Coal-Mining Machine. John Walton, Philipsburg, Pa.

GRANTED JANUARY 4TH, 1887.

- 355,304. Mechanism for Bending Metal. Lorenzo Dow, Boston, Mass.
- 355,331. Apparatus for the Manufacture of Gas. William F. M. McCarty, Philadelphia, Pa., Assignor to Jane Logan, Hagerstown, Md., and Adolph Ohl and B. C. Lauth, Philadelphia, Pa.
- 355,347. Quarry-Frame for Rock-Drills. Henry C. Sergeant, New York City.
- 355,390. Rolling-Mill. Frederick H. Daniels, Worcester, Mass.
- 355,391. Turbine Water-Wheel. Francis R. Estlow, Barnegat, New Jersey.
- 355,515. Lead-Pipe Reel. Frederick Eitapenc, Binghamton, New York.
- 355,524. Nail-Plate Feeder. James M. Bryant, Benwood, West Va., Assignor of two thirds to Peter Altmeyer and Christian Altmeyer, both of same place.
- 355,609. Nail-Machine. Louis J. Hirt, Rochester, New York, Assignor to the Standard Nail and Tack Company, Saco, Me.
- 355,626. Apparatus for Enriching Illuminating-Gas. Frederick B. Strunz, Pittsburg, Pa.
- 355,644. Tube-Expander. Charles E. Emery, Brooklyn, New York.
- 355,669. Hydraulic Mining Pump or Ram. Alfred E. Watkins, South Orange, New Jersey.
- 355,673. Gas-Regulator. Maurice Zecker, Cleveland, Ohio.

PERSONALS.

John T. McNeil, State Inspector of Coal Mines, Colorado, has been reappointed.

Mr. J. B. McClary has been appointed Assistant Superintendent of the Pratt Coal and Iron Company, Alabama.

Mr. Gideon Frisbee, General Manager of the Frisbee-Lucop Mill Company, has just returned from San Francisco, where he has been for several months, introducing the company's mills.

Prof. Frank E. Carpenter, of Rapid City, Dak., has been appointed Dean of the Dakota School of Mines, in place of Prof. Charles L. Constant, who declined the position. Mr. Carpenter is in this city at present, making purchases for the school.

Mr. A. M. Wellington has retired from the editorial staff of the *Railroad Gazette*, of this city, and Mr. W. Howard White has assumed the position of managing editor. Mr. S. Wright Dunning has given up the active editorial work on the *Railroad Gazette*, but will continue to contribute to the paper.

Mr. William Gurley, President of the Rensselaer Polytechnic Institute, and the well-known manufacturer of fine mathematical and engineers' instruments, died on the 10th inst., at his home in Troy, New York, aged sixty-six years. He had had pneumonia, and suffered a relapse.

Mr. E. E. Olcott, M. E., who has been at the Cerro de Pasco silver mines, Peru, for some time past, will return to New York by the middle of February. Mr. A. D. Hodges, Jr., will remain at the mines, continuing the investigations, which, we understand, have been attended with highly satisfactory results.

Mr. R. Billings, for the past four years the agent at Denver, Colo., of the Pueblo Smelting and Refining Company, has been appointed the General Purchasing Agent of that company, with full and complete power to purchase all ores, fluxes, and fuels. This is a new office in the company, which the growth of its business rendered necessary. Mr. Billings will make his headquarters in Pueblo.

In the death of John Roach, on the 10th inst., this country has lost a typical citizen. He was altogether a self-made man. Starting life with but little education and with no capital but industry and enterprise, he made his way, step by step, from the position of day laborer, which, as an immigrant without special skill in any industrial occupation, was all that he could command, to that of the largest and most enterprising American ship-builder. Mr. Roach was highly esteemed by those who were acquainted with him or had business relations with him. With a character capable of such great achievements, it was not surprising that he should have been an ardent and somewhat one-sided politician, and that he should have created antagonisms as great as his friendships. We see only the enterprising manufacturer who created a great industry and helped materially to promote the material interests of the country, and we record his death with sincere regret.

FURNACE, MILL, AND FACTORY.

The New Castle, Pa., wire nail works are now in operation.

The North Chicago Rolling-Mill Company, of Chicago, Ill., has increased its capital stock from \$5,000,000 to \$6,000,000.

The office of the Frisbee-Lucop Mill Company has been removed from No. 104 Washington street to No. 145 Broadway, New York City.

The Gem iron furnace at Milnes, Va., which has been idle since November 12th, by reason of having chilled, was put in blast on the 8th inst.

The New York warehouses of the Link Belt Machinery Company have been removed from No. 87 John street to the new building No. 49 Dey street.

The Prunty Manufacturing Company is about to begin the manufacture of Prunty relief valve and nozzles and other brass specialties, at No. 15 South Frederick street, Baltimore, Md.

The Riverside Iron-Works Company, Wheeling, West Va., will establish tube-works. The company owns ample grounds for several extensive additions to its present works at Benwood.

The Chicago Asbestos Mining and Manufacturing Company has been organized at Chicago, Ill., with a

capital stock of \$100,000, by Thomas J. Phillips, Frank Stinson, and Theodore Worcester.

The Douglassville Iron Company, Berks County, Pa., just organized, has applied for a charter, with D. K. Flannery, President; Dr. F. R. Gethard, Secretary; and John H. Egoft, Treasurer.

At a meeting of the Western Nail Association, held at Pittsburg, Pa., on the 12th inst., it was decided to advance the card rate on nails from \$2.40 to \$2.60 a keg. Wages of nail-makers will be advanced one cent a keg.

The Bessemer Land and Improvement Company, capital \$2,500,000, has been organized at Birmingham, Ala., to build up the new town of Bessemer, where two furnaces are under construction and a steel plant projected.

Messrs. Miller, Metcalf & Parkin, proprietors of the Crescent Steel-Works, Pittsburg, Pa., have purchased the double building Nos. 64 and 66 South Clinton street, Chicago, Ill., and are fitting it up for early occupancy.

The co-partnership of R. W. Coleman's Heirs, owning the Bird Coleman and Donaghmore anthracite furnaces and Cornwall charcoal furnace, in Lebanon County, Pa., has been changed to a limited association, styled the Cornwall Iron Company, Limited, William Coleman Freeman, Chairman.

One of the most important recent transactions in the South is the sale of the property of the Woodstock Iron and Steel Company and the Anniston Land and Improvement Company, of Anniston, Ala., for \$6,000,000. These two corporations owned a large part of the town of Anniston, two furnaces, 50,000 acres of mineral lands, etc. With this sale, arrangements were completed for the immediate construction of two coke-furnaces of 1000 tons capacity each week, and the building of a railroad from Anniston to Gadsden, Tenn.

The Nashville Steel, Iron, and Charcoal Company, of Tennessee, which has been organized with a capital stock of \$700,000, by E. W. Cole, J. M. Head, E. H. East, J. C. Neely, and others, has elected Gen. Willard Warner, of Alabama, President and General Manager, who will receive a salary of \$10,000; H. M. Pierce, Vice-President; M. A. Spurr, Treasurer; and James M. Reilly, of Buffalo, N. Y., Secretary. Two 50-ton charcoal blast-furnaces are to be located near Nashville, three miles down the river, on the forty acres given the company by the land syndicate that recently purchased several miles of river front. The erection of the chemical and charcoal works will begin at once.

The M. C. Bullock Manufacturing Company, Chicago, Ill., reports the following recent shipments: To John McDonald, Iron River, Mich., one double-cylinder portable hoist. To the Beacon Publishing Company, Akron, Ohio, one 56 horse-power straight-line engine; also, one large exhaust-fan. To the First National Mining Company, Hurley, Wis., one 50 horse-power boiler, one 14 by 20 engine, and two five-foot Lane patent band friction-drums. To the Blue Jacket Mining Company, Hurley, Wis., one 45 horse-power boiler, one 14 by 20 engine, and two four-foot Lane patent band friction-drums. To the Goss Printing Press Company, Chicago, one eight-page perfecting press for Grand Rapids, Mich., and one four-page perfecting press for Kansas City, Mo. To J. B. Maas, Negaunee, Mich., one Maas patent rock-drill and outfit. To the South Range Company, of Ironwood, Mich., one Bullock Little Champion diamond drill, with complete outfit. To the Iron King Mining Company, Hurley, Wis., one standard Lane patent hoisting-drum.

CONTRACTING NOTES.

CONTRACTS OPEN will be found on page xix. New Contracts this week: No. 178, for Water-Works; No. 179, for Coal; No. 180, for Steam-Hoister and Pile-Driver; and No. 181, for Water-Works.

The Montgomery Soap-Works, Montgomery, Ala., have enlarged their works, and desire to procure glass dies for pressing. These are said to be a recent discovery and an improvement on the metal dies. The company wishes the address of parties making these glass dies.

The People's Gas Company, of Pittsburg, Pa., is negotiating for pipe preparatory to laying about thirty or forty miles of low-pressure line in the central and lower parts of that city next spring and summer.

The Belmont Nail Company, of Wheeling, West Va., has contracted with Gordon, Strobel & Laureau, of Philadelphia, Pa., for the erection of a blast-furnace 65 feet high and 16 feet in the bosh, with Gordon hot-blast stoves. The product is to be used in the company's steel-works.

Messrs. Cramp & Sons, of Philadelphia, have contracted with Messrs. Carnegie, Phipps & Co., of Pittsburg, to supply the light steel sheets for the cruisers for the government, to be built at Philadelphia, the quantity being between 800 and 900 tons. These sheets are for the inner structural work of the vessels, and will be from 1½ to 2 inches thick. And with the Linden Steel Company, also of Pittsburg, to supply between 500 and 600 tons of heavy armor plates for the cruiser. Messrs. Park Brothers & Co., Pittsburg, have the contract for the boiler plates. The Phoenix Iron Company, Pittsburg, contracts to furnish all the steel shapes to be used in the construction of the cruiser. These include deck-beams, bulbs, angles, tees, channels, and a variety of shapes that have as yet, it is said, never been made in the United States. Messrs. Carnegie, Phipps & Co., of Pittsburg, have, in addition to the contracts with Messrs. Cramp & Sons, mentioned, also contracted to supply about 1400 tons of light steel sheets for the cruisers to be built for the government by the Union Iron-Works, San Francisco, Cal.

The Cincinnati Gas-Light and Coke Company, Cincinnati, Ohio, has contracted with the city to deliver gas for ten years at \$1.25 per 1000 cubic feet.

Bids will be asked for the Sault Ste. Marie Bridge, Canadian Pacific Railroad, which will be 2500 feet long.

The contract for furnishing granite bond stones for the city hall tower, Philadelphia, Pa., has been awarded to the Mount Waldo Company at \$7950.

To the Edison Electric Lighting Company has been awarded the contract for furnishing the electric lighting apparatus for the new cruiser Chicago.

The U. S. Engineer Office, Newport, R. I., has received the following bids for dredging at Wood's Holl, Mass.: Frank Pidgeon Dredging Company, \$1.10 per cubic yard; Hartford Dredging Company, \$1.33. For removing rock: George W. Townsend, \$118; Hiram W. Phillips, \$285; Charles E. Davis, \$375; Frank Pidgeon Dredging Company, \$575.

Capt. W. H. Bixby, U. S. Engineers, Wilmington, N. C., has received the following bids for dredging Cape Fear River, N. C. Bids for this work were first opened November 9th, and the lowest (14'9c.) bid rejected as being too high. P. Sanford Ross, Jersey City, N. J., 11'9 per cubic yard, scow measure, former bid 15'2c.; George C. Fobes, Baltimore, Md., 14c., former bid 16½c.; Morris & Cumings, New York, 13c., former bid 15½c.; American Dredging Company, Philadelphia, Pa., 10½c., former bid 15½c.; Rittenhouse Moore, Mobile, Ala., 9c., former bid 15½c.; National Dredging Company, Wilmington, Del., 10½c., former bid 15½c.; Atlas Dredging Company, Wilmington, Del., 9c., former bid 14'9c. Amount of contract \$50,000; work to be completed by October 1st, 1888.

W. F. Smith, U. S. Agent, Wilmington, Del., has received the following bids for dredging Nanticoke River: Thomas P. Morgan, Washington, D. C., 12c. per cubic yard, measured in place; American Dredging Company, Philadelphia, Pa., 16½c.; George W. Parsons, Salisbury, Md., 18½c. and 20½c.; Frank C. Somers, Philadelphia, Pa., 11½c. Contract awarded to Frank C. Somers. And for St. Jones River: Thomas P. Morgan, Washington, D. C., 18c. per cubic yard, measured in place; National Dredging Company, Wilmington, Del., 16'9c.; American Dredging Company, Philadelphia, Pa., 12c.; Atlas Dredging Company, Wilmington, Del., 17c.; Frank C. Somers, Philadelphia, Pa., 14½c.; Thomas Draper, Dover, Del., 16c. Contract awarded to American Dredging Company.

The Kanawha & Ohio Railroad Company will erect machine-shops at Charleston, S. C. About \$30,000 worth of machinery will be purchased.

Information about railroad bridges to be erected by agreement between the city and the railroads can be obtained from the City Engineer of Harrisburg, Pa.

The city of Chicago, Ill., has awarded a contract for \$111,342.73 worth of water-pipe to the Lake Shore Foundry, of Cleveland, O. The contract calls for 3597½ tons, as follows: 500 pieces of 4-inch, 5000 pieces 6-inch, 3000 pieces 8-inch, 200 pieces 12-inch,

1000 pieces 16-inch, 450 pieces 24-inch, and the average price of goods, by contract, is \$30.95 a ton. The other bidders were: D. Long & Co., Louisville, \$33.47 throughout; Shickle, Harrison, Howard Co., St. Louis, \$33.40 throughout; Cincinnati Newport Gas and Pipe Company, \$33.60 throughout; McNeal Pipe and F. S. Company, Burlington, N. J., \$36.60 for 4-inch pipe, \$35.25 for 6-inch, \$35 for 8-inch, \$34.75 for 12-inch, \$34.25 for 16-inch, \$33.50 for 24-inch; R. D. Wood & Co., Philadelphia, \$30.80 on three higher sizes only; Buffalo C. I. Pipe Company, Buffalo, \$28.75 for 12 and 16-inch, \$28 for 24-inch.

The Warren Foundry and Machine Company, of Phillipsburg, N. J., will furnish the pipe required in connection with the new water-works, Randolph, Mass. It amounts to about 2300 tons of from 4 to 14 inches in diameter; 200 hydrants, stand-pipes, pumping-stations, and machinery will be contracted for this month.

The report of Superintendent Armstrong, of the Water-Works, and City Engineer Ehlers, to the Water Committee, Alleghany, Pa., on the cost, etc., of moving the water-works farther up the river, shows that, in making estimates for the delivery mains, two systems were considered, one of cast-iron pipe and the other of steel pipe. Of the former, it would take 36,000 tons of iron; and of the latter 18,141,309 pounds. It is now proposed to erect two engines with a capacity of 8,000,000 gallons a day.

James P. Witherow, Pittsburg, Pa., has contracted to build a Clapp-Griffith steel-works at Danville, Pa. The capacity of the works will be about four hundred tons a day.

The Board of Water Commissioners, Minneapolis, Minn., opened the bids on the 7th inst. received for materials to be used in 1887. They were as follows for pipe for 6, 8, 10, 12, 16, and 24 inches, weighing 6980 tons: Cincinnati & Newport Iron Pipe Company, \$36.94 for each; Dennis, Long & Co., Louisville, \$36.25; Shickles, Harrison & Co., St. Louis, \$36.90; McNeal Pipe and Foundry Company, Burlington, N. J., \$38.50. For 400 hydrants: R. D. Ward & Co., Philadelphia, \$36.50 for each; Holland-Thompson Manufacturing Company, St. Paul, \$45.11; Ball & Naylor, Minneapolis, \$52; Addinter & Killops, Chicago, \$39; Holyoke Manufacturing Company, \$34.79; National Tube-Works, Chicago, \$35; James Flower & Brothers, Detroit, \$39.52; Lockwood, Upton & Co., Minneapolis, \$39.90; Chapman Valve Manufacturing Company, Minneapolis, \$45.11; Fulton Iron-Works, St. Louis, \$68.50; Coffin Valve Company, Boston, \$37; Eddy Valve Company, Waterford, N. Y., \$27.50; Galvin Brass and Iron-Works, Chicago, \$40; Holly Manufacturing Company, New York, \$31. On gates, the prices varied as follows: On 6 inches, from \$10 to \$18.50; on 8 inches, \$16.25 to \$30; on 10 inches, from \$21.10 to \$49; on 12 inches, \$31.50 to \$78.50; on 16 inches, \$52.50 to \$130; on 24 inches, \$145 to \$315.

The Department of State has been informed by the Consul at Odessa that it is possible that steps will soon be taken to construct a petroleum pipe line from Baku to Batoum. The size of the pipe talked of is about seven inches inside diameter, the length of the line about 550 miles, and its greatest elevation about 3000 feet. The consul desires that the matter be brought to the attention of American pipe and pump manufacturers, that they may compete with manufacturers in Europe for supplying the necessary material.

LABOR AND WAGES.

The delegate meeting of miners, held at Cumberland, Md., at which Sub-District No. 2, National District Assembly, Knights of Labor, was organized, adjourned on the 8th inst.

The men employed in the Joliet Steel-Works, at Joliet, Ill., have received an increase of 12½ per cent in the converting department and 13½ per cent in the rail department.

The Miners and Laborers' Subdivision, No. 1, of District Assembly 135, representing 100,000 mine employes of the anthracite coal-fields, was in session at Hazleton, Pa., last week. The principal work of the body was the formation of all the local assemblies under one head, with P. F. Brennan, of Girardville, H. McGarvey, of Beaver Meadow, and John J. Meehan, of Driftwood, as master workman, secretary, and treasurer, respectively. It was resolved to prosecute one of the coal operators before the courts of Luzerne County for a violation of the mine laws, in order to test the constitutionality of the law.

GENERAL MINING NEWS.

BONANZA DEVELOPMENT COMPANY.—According to reports, the sale of this company's half-interest in the Santa Rita mine, which has recently been talked of, is awaiting the strengthening of the copper market, an English syndicate standing ready to buy the mine when a little more improvement in the copper situation is manifested. The company, it is said, has now \$150,000 in its treasury, equal to fifty cents a share upon its 300,000 shares of stock. If the sale is consummated, it is believed that it will be for \$1,500,000 for the whole Santa Rita mine property. One half of this, or \$750,000, would go to the Bonanza. Besides this, the company has 1,000,000 acres of land, for which \$1 an acre has been refused.

SOUTHERN NATURAL GAS AND OIL COMPANY.—This company has been formed for the development of a large quantity of mineral lands already taken up in West Virginia, Ohio, and Kentucky.

ALABAMA.

The Acting Secretary of the Interior last week transmitted to the Senate a response from Commissioner Sparks, of the General Land-Office, to the resolution offered by Senator Morgan calling for the reasons why the coal and iron lands in Alabama have been withheld from sale, and whether any evidence is on file in the department that discloses the existence of a conspiracy or combination unlawfully to affect the sale of the lands under the act of March 3d, 1883. The commissioner says the proclamation ordering the sale of these lands was revoked by the President January 29th, 1884, and a subsequently ordered sale was postponed indefinitely. This action was taken in consequence of communications from W. H. Lawson, of Montgomery, Ala., G. W. Paisley, an inspector of the General-Land Office, and Governor O'Neal, of Alabama, all alleging the existence of a combination to control the sale of these lands. The report of Inspector Paisley says that a secret meeting of mining companies had been held in Birmingham for the purpose, it was generally believed, of forming a combination to crush all individual competition and secure all these lands at the rate of \$1.25 an acre.

JACKSON COUNTY.

ALABAMA BLACKBAND IRON, COAL, AND RAILROAD COMPANY.—This company, formerly the Jackson Coal, Iron, and Railroad Company, is said to be the first company organized for developing the minerals of this county. The land to be developed lies in the northern part of the county, in the Cumberland range of mountains. The amount purchased is 18,000,000 acres, and contains both coal and iron in contiguous beds. The iron is blackband ore, and assays by six or more chemists show a yield of 34 per cent iron. The iron lies in a bed from 7 to 9 feet thick. The coal is a very hard quality of bituminous. The veins of this are four feet and over.

MARSHALL COUNTY.

Messrs. Edwin O. Neely and Henry B. Gniffke have leased for Northern parties about two thousand acres of coal land on the Tennessee River near Gunter'sville. This coal is said to be fine coking coal. Developments will soon begin.

ARIZONA.

MOHAVE COUNTY.

ARIZONA NORTHERN MINING COMPANY.—It is stated that this company has purchased the mill property at Beal Springs, for about \$2000, from Mr. A. F. Simonds. It is supposed that the machinery will be moved over to a point near the Sunlight and Connor mines. Hoisting-works are erected at the latter mine.

YUMA COUNTY.

HARRIS MINING AND MILLING COMPANY.—The ten-stamp mill has started up successfully. There is an abundance of ore on the dump and in sight that will average all the way from \$8 to \$15 a ton in gold. The cost of mining and getting to the mill, it is said, will not exceed \$4 a ton, while the price of milling is reduced to the minimum. Wood is \$3 a cord laid down at the mill.

CALIFORNIA.

It is estimated that 30,000 flasks of quicksilver were produced in 1886.

NEVADA COUNTY.

One of the great mining schemes in California is a twelve-mile tunnel for draining the entire group of mines in Nevada City and Grand Valley. The water power of Yuba River will be used to drive the drills and to propel the cars. The tunnel where it enters the mines will be 1200 feet below the surface. There has

been subscribed, it is said, \$1,000,000 toward the expenses of the work, but the engineer expects to pay the cost from ore extracted in digging.

COLORADO.

BOULDER COUNTY.

CARIBOU.—Pumping the water from this mine goes on rapidly, and it will be in shape for working by February. This mine was at one time one of the leading mines of the State, and has an interesting history. The principal owner of this mine now is Mr. R. G. Dun, of New York.

CLEAR CREEK COUNTY.

COLORADO CENTRAL.—Official advices to us show the production for December to have been 98 tons, which sold for \$18,505.93. Work has been discontinued for the present on the 650-foot level, owing to a scarcity of water-power. The shaft has attained a depth of 710 feet, and is in good ground. Sinking continues.

FREELAND.—We have been officially advised that the production for December was: Gold, \$19,836.96; silver, \$3895.66; copper, \$137.76; total, \$23,870.38. Total for the year, \$297,757.98.

PLUTUS.—Official advices to us show the production for December as follows: Gold, \$2450.75; silver, \$2237.79; copper, \$99.85; total, \$4788.39. Total for the year, \$145,783.11.

CUSTER COUNTY.

PHOENIX.—The Bull-Domingo mine, the property of this company, is raising from 6 to 8 tons of ore daily, and the concentrator is getting into shape for active operation.

SECURITY.—The Silver Cliff mine, the property of this company, it is said, is getting into good shape for working, and can supply 200 tons of ore daily to the mill, which will start probably in two months. Various improvements have been made.

GILPIN COUNTY.

WINNEBAGO.—Judge D. D. Belden, of Denver, is at present in St. Louis, negotiating the sale of 50 per cent of the stock of this company. This property includes eight mines, on which much development work has already been done, a 1200-foot tunnel and several shafts being already completed. With the money obtained from the sale of the stock, it is intended to erect a twenty-five-stamp mill, which is required for the working of the ore. The property is stocked for \$200,000.

LAKE COUNTY.

From the Leadville *Herald-Democrat*, we condense the following:

AMERICAN MINING AND SMELTING COMPANY.—The company has secured renewal of its lease on the western portion of the Crescent mine, and has resumed the sinking of the shaft that it began last year.

HARRISON REDUCTION-WORKS.—The construction of a slag elevator at these works is nearly completed. The new device is ingeniously constructed, and will prove efficient and durable.

IDEAL.—The company has taken up another claim, and named it the Mesquite. It adjoins the Katy. This makes four full claims that the company owns.

IRON SILVER.—This property, during the past year, under the efficient management of Col. S. S. Robinson, has made a remarkable showing. The mine during 1886 produced 30,000 tons of ore and paid \$300,00 in dividends. About two miles of underground workings were driven, and the resources in sight are estimated equal to last year's production. The new Robinson shaft, on the south side of California Gulch, is down 400 feet, and almost daily expected to encounter the ore-zone.

LEE BASIN.—Owing to the unusual dip of the vein in this Basin mine, it has become impracticable to further extract ore through the openings, and work has been temporarily suspended through the Wright shaft. In the mean time, the Shamus O'Brien and Olive Branch shafts are rapidly sinking, and both will soon open to the vein considerable distances to the north and northeast of the Wright shaft. As soon as this work can be completed, the Lee Basin property will resume its former large production of ore.

MINNIE AND A. Y.—The aggregate amount of ore just contracted for is 2500 tons, and is divided between the Omaha & Grant smelter at Denver, the Golden Smelting-Works, and the Manville smelter, of Leadville. A contract for the product of the new concentrating mill, during the next six months, has also been closed with the Omaha & Grant works. While the contracts cover a considerable amount of ore, yet it is more than likely that they will not absorb the entire

production of these mines. In prosecuting work from the pump-shaft, a large body of ore was struck in the second level. This is about thirty-five feet below the point to which the ore was estimated to descend, and adds largely to the resources of the mine.

QUEEN CONSOLIDATED.—Three shifts were put to work in the Keystone shaft of the Queen Consolidated property, on Yankee Hill. This company, which recently secured a large and valuable piece of territory, intends to further the development of its territory and open up the resources existing in it. The Keystone shaft, on which work was started, has a depth of 289 feet, and is to be sunk 100 feet more as rapidly as possible. As soon as the sinking of the shaft is completed, a drift will be driven to intercept a known ore-body, which had been previously opened in an inclined drift and winze.

PITKIN COUNTY.

HARRISBURG & DENVER CLAIMS.—Mr. H. B. Gillespie has bought the Harrisburg & Denver claims, located at Aspen, for \$16,000. The side-line apex controversy, involving the Harrisburg and Bob Ingersoll mines, has been compromised by a consolidation of the two claims.

SCHILLER.—Mr. F. Combs has disposed of a twenty-fourth interest in the Schiller, on Aspen Mountain, to Mr. N. G. Coffin, and a twelfth interest to Mr. H. K. Devereux for \$6000.

DAKOTA.

LAWRENCE COUNTY.

CALEDONIA.—The official report for the week ended the 3d inst. shows 1412 tons of ore produced.

IDAHO.

The following estimate of the production of gold, silver, and lead in Idaho during 1886, has been prepared by the Boise City National Bank, and is approximately correct. The addition of 10 per cent to the total is for gold taken out of the territory by Chinese and others of which no account could be obtained: Gold, \$2,664,500; silver, \$5,032,000; lead, \$1,655,000; total, \$9,351,500; add say ten per cent, \$10,287,000.

HELENA CONCENTRATING COMPANY.—This company, the place of business of which is at Wardner, is negotiating with Portland parties for the sale of its plant. The Portland Company is also figuring for the purchase of the Bunker Hill and Sullivan mines, which the Helena Company now holds under lease. There is a verbal option on the property until about the first of 1887. The prospective sale is said to involve about \$600,000 in cash.

ALTURAS COUNTY.

CARRIE LEONARD.—This property, which is located in Smoky District, about thirty-five miles from Hailey, has yielded during the past year ore to the value of over \$70,000. After putting in a concentrator and ore-house, and making other improvements, the property paid \$30,000 in dividends. The owners were J. O. Swift, who owned one third, and Walter Clark and partners, who owned the other two thirds of a group of seven mines, consisting of the Carrie Leonard, Pot Wrestler, Railroader, Rachel, Clark, Covert, and Alice. The Pot Wrestler shows good ore, and the Carrie Leonard is a mine that has been yielding some ore for years, but the other claims are as yet only prospects. The entire group has been sold for \$105,000 to Messrs. R. C. Chambers, J. C. Conklin, and Boyd Park, all of Salt Lake City. The purchasers own other claims in that district.

DEADWOOD.—Messrs. Shaughnessy and Groesbeck, it is understood, have a bond on this property, which adjoins the Tip Top, and for which they are to pay \$50,000 by the 1st of April next. It is understood to be the intention of Messrs. Shaughnessy and Groesbeck to organize a company in New York City to exploit it.

MINNIE MOORE.—This mine, which, according to reports, is making a splendid record for itself, it is said, will soon go into the hands of a London company.

TIP TOP.—A bond has been given to Mr. Shaughnessy, according to which the owners agree to deed to him, on or before the first day of October, 1887, on the payment of \$150,000 at the Deseret National Bank, in Salt Lake City, the Tip Top property.

TRIUMPH.—A one-third interest in the Grover Cleveland claim, on the East Fork of Wood River, has been purchased by this company. During the past year, the company has prosecuted its development-work so close to the line of the Grover Cleveland as to necessitate the starting of its exploring tunnel and the location of buildings on the latter-named ground.

ILLINOIS.

PIEDMONT COAL COMPANY.—This company has been organized at Chicago, with a capital stock of \$20,000; incorporators, Edward T. Sawyer, Monroe L. Willard, and Henry M. Wolf.

INDIANA.

BRAZIL BLOCK COAL COMPANY.—This company is arranging to sink a shaft near Carbon. It has also purchased considerable coal land near Rosedale, ten miles northwest of Brazil, on the Chicago & Indiana Coal road, where shafts will be sunk.

COAL BLUFF COAL COMPANY.—This company has just purchased the shafts of the Edgar Coal Company, at Coal Bluff, near Rosedale, and will push work there. The coal is semi-block and bituminous, the latter being of superior quality, it is said, and suitable for coking.

HOWARD COUNTY.

SOUTH KOKOMO NATURAL GAS AND OIL COMPANY.—A strong vein of gas was struck last week at well No. 3 at a depth of 907 feet.

MAINE.

KNOX COUNTY.

ROCKLAND GRANITE COMPANY.—This company, whose works are at Rockland, has leased and opened a quarry on the shore of Long Island, where there are good facilities for loading cargoes. About 250 tons have been quarried with the most satisfactory results. The stone is light color, very fine grain.

MEXICO.

The Mexican *Financier* reports the following:

An ancient tin mine has been discovered in the State of Durango, and a company is to be formed to work it with a capital of \$2,000,000. This mine was formerly owned by Spaniards, and was practically abandoned about a half-century ago. The ore-vein is reported as being eighteen inches thick, and the result of assays shows from 11 to 36 per cent of metallic tin.

SANTA ELENA MINING COMPANY.—This company has been organized in Iowa, with a capital stock of \$3,000,000, shares \$100 each, non-assessable. Seventy-five thousand shares are retained by the company as reserve fund. M. E. Andrews is President, H. H. Huntoon, Vice-President, A. B. Cummins, Secretary, George C. Baker, Treasurer. There are five mines, the Dos Américas, the already locally famed ruby silver mine, which was formerly the old Spanish mine El Principe; the Bolado, joining the former on the west, which incloses the long famed mine of Purisima de Quartes; the Santa Maria; the Maud Bonanza has in its near center a one-half-mile of water-course containing sufficient water to supply reduction-works of a capacity of 1000 tons daily. The property in surface plan covers 337 acres. Of old and new work in tunnels, cross-cuts, and shafts, there are at least 3575 feet.

MICHIGAN.

COPPER MINES.

The following statement gives the products of the mines mentioned for December and for twelve months, and a comparison with the outputs of the same mines in the two preceding years:

	December			Jan. 1 to Dec. 31.		
	1886.	1885.	1884.	1886.	1885.	1884.
Calumet & Hecla	2,630	2,406	2,450	30,401	29,071	28,852
Quincy	350	261	260	3,578	3,546	3,443
Atlantic	235	201	682	2,614	2,406	2,302
Tamarack	227	227	2,408			
Franklin	212	281	227	2,375	2,456	2,018
Osceola	175	180	206	2,032	1,150	2,508
Huron	76	135	120	1,853	1,383	1,193

TAMARACK.—The superintendent expects soon to begin hoisting ore from the sixth level. This level opens up 1000 feet of working ground, or as much as all of the upper levels combined. No. 2 shaft was down 314 feet January 1st. The company expects to handle 300 tons of stamp-rock daily this month.

GOLD AND SILVER MINES.

ROPES.—We have been officially advised that the production for December was: Gold, \$4019; silver, \$370; total, \$4389; total for 1886, \$41,384.

MONTANA.

BEAVER HEAD COUNTY.

HECLA CONSOLIDATED.—The official statement shows the production for the past year to have been as follows: 4,102,040 pounds of lead; 64,786 pounds of copper; 398,707.15 ounces of silver; and 79,979 ounces of gold.

GALLATIN COUNTY.

Trail Creek is now the most active coal camp in Montana. Many of the miners are mainly drawn from the almost abandoned camp at Timberline. Several concerns are working there, among them the Chestnut and Hodson mines.

F. M. FRENCH'S BILLING COMPANY.—Active operations are carried on by this company in the Trail Creek camp. An effort is made weekly, it is said, to secure a contract to supply the Northern Pacific to a partial extent.

LIVINGSTON COAL AND COKE COMPANY.—The company has been much delayed in erecting its twelve coke-ovens by reason of the non-arrival of brick ordered from Ohio. It is expected, however, that the material will arrive soon, when the ovens will be completed and active operations in the production of coke begun. Meanwhile, men are developing the mines owned by the company and getting out coal to supply the Helena gas-works. If the operation of the coke-ovens now erecting is satisfactory, an indefinite number in addition will be built and a spur from the Northern Pacific to the mines constructed.

NORTHERN PACIFIC COAL COMPANY.—At the company's mine at Timberline, no coal is mined, but a cross-cut tunnel is running to strike the ledge. An air-compressor and Burleigh drills have been put in to drive the tunnel and for future operations.

JEFFERSON COUNTY.

ELKHORN.—The production for December amounted to \$24,000. Work is now pushed on the 650-foot level, between the 550 and 650 levels, and also between the 450 and 550-foot levels. These are sunk more especially for the purpose of a better circulation of air. A force is also busy sinking from the 650-foot level, which will be continued until the 1000-foot level is reached. As soon as the 750-foot level is reached, a large Knowles pump will be put in at that level capable of throwing 750 gallons a minute.

SILVER BOW COUNTY.

LEXINGTON.—We have been officially advised that the production for December amounted to: Gold, \$6460; silver, \$57,415; total, \$63,875.

MOULTON.—The official report for December shows gold produced, \$2378; silver, \$50,613; total, \$52,991.

NEVADA.

ELKO COUNTY.

It is reported that the furnace at Sprucemont has been sold to an Eastern company, and that it will begin building a 40-ton furnace immediately. The furnace now running at that place is of thirty tons capacity.

STOREY COUNTY—COMSTOCK LODE.

The Virginia City *Chronicle* reports the following: The following are the financial balances of the various Comstock mining companies on January 1st:

CASH ON HAND.	
Andes	\$6,294.00
Alpha	8,891.77
Best & Belcher	25,422.12
Felcher	2,865.37
Bullion	6,277.00
Chollar	47,420.32
Crown Point	24,059.08
*Con. Cal. & Va.	192,657.22
Eschequer	20,138.91
Gould & Curry	14,203.30
Hale & Norcross	\$3,513.31
Lady Washington	891.52
Mexican	2,221.14
Ophir	6,085.77
Occidental	4,413.53
Potosi	21,105.70
Scorpion	9,044.00
Sierra Nevada	4,689.94
Union Con	15,769.03
Utah	5,644.06

* In cash, and \$260,642.93 assay value of unsold bullion. To this is to be added bullion in transit and now on deposit at Virginia City, which will swell the total balance of available cash on hand to nearly \$550,000.

INDEBTEDNESS.

Savage..... \$36,023.42
The pay-rolls of the various companies in December amounted to about \$215,929.

CONSOLIDATED CALIFORNIA & VIRGINIA.—The exploration of the ore development on the 1300, 1400, 1500, and 1650 levels has been actively resumed, and no trouble is experienced from the gas generated by the smoldering fire in the old stops on the 1600 level. During the week ended the 31st of December, there were shipped to the Morgan mill 851 tons of ore, and to the Eureka mill 1647 tons. The average assay value of the ore worked at these two mills, according to assays of samples from the batteries, was \$36.17 a ton. Bullion shipped to San Francisco, assay value, \$86,404.57.

CROWN POINT & BELCHER.—Ore shipments for the week ended December 31st will foot up 2700 tons. Explorations are in progress on the 1500 level in both mines.

EAST BEST & BELCHER.—Sinking the shaft has been resumed. The bottom is showing stringers of metal-bearing quartz.

HALE & NORCROSS.—An ore development of importance has been made in advancing the south drift on the 1300 level, near the Chollar north line. The drift where the ore development was made is bulkheaded by order of President Levy. The reason

surmised for this action is, that the management is desirous of prospecting the development at other points, to ascertain its extent and value before the public becomes unduly excited.

NORTH GOULD & CURRY.—The shaft has been drained and retimbered and sinking resumed. The bottom is in vein-matter.

SAVAGE.—The cross-cut on the 600, sent in 100 feet south of the ore development on that level, shows vein matter. Some ore is extracted from the north and south drifts from the Sutro Tunnel line on the 1640 level.

YELLOW JACKET.—Ore-shipments average 150 tons daily.

WHITE PINE COUNTY.

SWEETWATER.—It is the intention to put up concentrators, and erect a 60-ton furnace in the spring.

PENNSYLVANIA.

COAL.

The annual examination for mining bosses of the Seventh District bituminous mines was begun at Pittsburg on the 11th inst. There are 42 applicants. The examination is conducted by James Blick, Inspector of the Seventh District, and August Steiner and Roger Hartley, of Pittsburg.

PHILADELPHIA & READING.—The annual meeting of the Philadelphia & Reading Railroad Company was held in Philadelphia on the 10th inst. The report for the year ended November 30th, 1886, showed: Gross receipts for the year, \$30,527,408.70; expenses, \$17,354,040.59; balance, \$13,173,368.11; gross earnings of the Coal and Iron Company, \$15,846,411.70; expenses, \$16,993,463.66; deficit, \$1,147,053.96; net receipts of both companies, \$12,026,309.15. The joint earnings of the Reading through the Jersey Central were \$8,482,436.70; expenses, \$9,843,802.69; deficit, \$1,361,365.99. The cost of transportation of coal per ton has decreased since 1879 from 1 1/4 cents per car per mile to less than one cent, and during the fiscal year the Coal and Iron Company spent in improvements \$592,794.93. The floating debt of the railroad company is \$9,580,170. The current debt is \$26,301,658. The total debt of the railroad and the Coal and Iron Company is \$29,979,273, an increase over the last fiscal year of \$4,109,096. The report was adopted. The following officers were elected: President, Austin Corbin; Managers: J. V. Williamson, John Wanamaker, A. J. Antela, Peter C. Hollis, Samuel R. Shipley, Thomas Cochran; Treasurer, William A. Church; Secretary, William R. Taylor. The new men elected to the board are Messrs. Shipley and Cochran, who succeed Dr. Hostetter and Amos Watson, of Pittsburg.

NATURAL GAS.

CHARTERS VALLEY GAS COMPANY.—At a meeting of stockholders, held at Pittsburg on the 5th inst., the capital stock was increased from \$2,000,000 to \$3,000,000. The money to be derived from the sale of the 10,000 shares of new stock will be devoted to the payment of the bonded debt, of which \$500,000 was created about a year ago, and of such floating debt as may exist. The surplus will be applied to a further increase in the plant should it be considered necessary. The company has also purchased the plant and franchises of the North Side Gas Company, which is said to be a valuable addition. The earnings of the company are now \$40,000. The company has just declared its first quarterly dividend, and expects to continue paying dividends quarterly hereafter. The dividend just announced is only on the old stock. Preparations are making for listing the stock on the New York Stock Exchange.

PEOPLE'S GAS COMPANY.—Extensions to the plant will be made, which were retarded somewhat by the litigations between the company and the Pittsburg city authorities, which have been pending in the County and Supreme Courts, but are now ended.

NORTHAMPTON COUNTY.

GLENDON IRON COMPANY.—The largest blast ever fired in this county was touched off by Superintendent Firmstone, of this company, on the 8th inst. It consisted of 44,500 pounds of powder, distributed in five chambers, each fifty feet apart and fifty feet back from the face of the quarry. The whole hillside, 150 feet high, was blown out and about 200,000 tons of stone were loosened.

OHIO.

The Chief of the Bureau of Statistics reports the total values of the exports of mineral oils from the United States for the month of December, 1886,

and during the twelve months ended December 31st, 1886, as compared with similar exports during the corresponding periods of the preceding year, as follows: December, 1886, \$3,591,961; December, 1885, \$4,147,686; twelve months ended December 31st, 1886, \$47,016,775; twelve months ended December 31st, 1885, \$49,244,759. These exports comprise about 99 per cent of the total exports in mineral oils.

UTAH.

SUMMIT COUNTY.

WAHSATCH.—The suit of the Wahsatch Mining Company vs. the estate of William Jennings, came up before Judge Boreman in chambers, at Salt Lake City, on the 3d inst. It will be remembered that this company's property includes the Walker & Webster and Buckeye mines, on which the Crescent Company had made one payment of \$7500 to Mr. Jennings, and which both parties litigant have agreed shall be sold in good faith to the Crescent, whichever one of the two is finally victorious. Some time ago, the Wahsatch Company (comprising nearly all the stockholders except the Jennings estate) secured a decision of the court in its favor. The case above referred to was for a settlement of the damages due the company from the Jennings estate on the report of Judge Sprague, the referee appointed by Judge Zane. After looking into the report, Judge Boreman decided that the plaintiffs were entitled to \$33,000 damages from the Jennings estate, with interest at 10 per cent. The amount remaining to be paid on the property by the Crescent to the successful litigant is \$42,500. The case will probably go to the highest tribunal before it is settled.

TOOELE COUNTY.

FRITZ HILL MINING COMPANY.—This company, which owns the Katherine mine at Stockton, shipped during the first ten months of last year over 1450 tons of ore, at an average value of \$67.50 a ton, and a net profit of over \$41,000. The company also owns the Alps and Rambler.

MARKETS.

NEW YORK, Friday Evening, Jan. 14.
Prices of Silver per ounce Troy.

Jan	Sterling exchange	London Pence.	N. Y. Cents	Jan	Sterling exchange	London Pence.	N. Y. Cents
8	4.85	46 1/2	100 3/4	12	4.86	46 3/4	101 3/4
10	4.85 1/2	46 3/4	101	13	47	102 1/4
11	4.86	46 3/4	101 3/4	14	47	102 3/4

*These are "working" sight Exchange rates.
+46 15-16.

Silver has advanced under the combined influence of a firm London Exchange market, and an increased demand for East Indian account.

Production of the Precious Metals in the United States, Mexico, and British Columbia.—The annual statement of Wells, Fargo & Co.'s Express in regard to the production of the precious metals in 1886, just issued, shows the aggregate products as follows: Gold, \$30,773,759; silver, \$53,776,055; copper, \$9,276,755; lead, \$9,185,192; total gross result, \$103,011,761.

Foreign Bank Statements.—The governors of the Bank of England, at their weekly meeting, made no change in the bank's minimum rate of discount, and it remains at 5 per cent. During the week, the bank gained £282,000 bullion; and the proportion of its reserve to its liabilities was raised from 30 3/8 to 38 per cent, against 36 1/2 per cent at the same time last year. On the 18th inst., the bank gained £5000 bullion on balance. The weekly statement of the Bank of France shows a loss of 6,800,000 francs gold and a loss of 3,975,000 francs silver.

Copper.—Some of the Butte papers attempt to correct our statistics of copper production for Montana, making out that it was 55,000,000 pounds, instead of 48,000,000 as announced before we received the Anaconda official statement, and 56,268,000 as given in our last issue. These papers go into details and put the Anaconda production at 24,000,000 pounds, instead of 25,000,000, as we had estimated, and 33,267,864 pounds, as stated by the company. The other figures that we published were official, and the Butte exaggerations are without foundation. It is rather curious that the Butte papers, always striving to magnify the Anaconda, should place the output a little lower than our own estimate and 9 1/4 millions below the company's "official" report. Strange that these Butte papers, there on the ground, can't tell within 25 per cent how much the mine, for which they appear to exist, is producing.

This market is quiet but firm. A little Lake in second hands has been thrown on the market, and has reduced quotations among brokers, but none of the Lake companies has sold or is selling below 12 cents, and some of them ask the extra freight in addition. We believe 12 cents will not be broken before spring. Casting brands are quiet but firm, at last quotations, 10 3/4 @ 11 1/2 c., according to brand.

Chili Bars are quoted to-day £39 @ £39 2s. 6d. Best Selected £43 10s.

We hear from excellent sources that the production of copper in Chili and Bolivia is declining, and some of the mines are stopping on account of the low price in London. It is estimated that in future the production will scarcely exceed 24,000 tons a year.

The Baltimore Works are reported to be idle, and the stopping of the Anaconda furnaces, reported in our last issue, is said to be on account of much trouble with furnace bottoms, and other things.

Tin.—This metal has again improved a little in price, and is quoted from London to-day £101 12s. 6d. for Spot Straits. Here, the metal has advanced to 22'60 @ 22'65c. per pound for Spot, and January, and February.

Lead.—This market is in quite a flurry. Prices have advanced, and we hear of 4'30c. having been paid, and subsequently 4'35c. and 4'40c. refused.

Direct advices from nearly every refiner and many of the large dealers in the West to-day are, that they decline to sell at present prices, or, in a few cases, say that 4 1/2 c. would be accepted for a small lot or a few hundred tons convenient delivery.

We hear of no tangible ground for the advance, but that it is here is beyond question.

Manufactures.—Lead pipe is quoted at 6 1/2 c. and Shot at 7 1/2 c., less the usual 20 per cent discount. Shot is \$1.60 for Drop and \$1.85 per bag, 25 pounds, for Buck and Chilled. Tin-lined Lead Pipe, 15c., less 20 per cent discount.

Messrs. Everett & Post, of Chicago, telegraph as follows to-day:

Market quiet but firmer; 4'5c. asked. More inquiry is noticeable. Sales during the week were 300 tons at 4c. Later: Market excited. Sales fifty tons at 4'20c. Consumers coming to the front.

Spelter.—The London market is cabled £14 10s. for Silesian. Our market here is strong but quiet. We quote 4'55 @ 4'70c. in store for Western brands, and 6 1/2 @ 7c. for New Jersey.

New Jersey Zinc Oxide, 4 @ 4 1/2 c., according to grade.

Antimony.—Cables to the Metal Exchange to-day quote Hallett's at £30. We quote here 7 1/2 @ 7 3/4 c. for Hallett's and 9c. for Cookson's.

Nickel.—We quote 60c.

Aluminium.—Is quoted at 90c. @ \$1 an ounce.

Quicksilver.—The market remains unchanged, and we continue to quote 52 1/2 c. a pound here, and in London £7 7s. 6d.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Jan. 14.

American Pig.—This market, though very firm, is quiet, and a good many are beginning to think that iron is high enough, in which opinion we ourselves share. It is by no means impossible that prices may advance still farther, but there certainly is not so general a feeling that they will as was met with two weeks ago. It is true that \$22 has been obtained for small lots of Thomas iron in second hands; but most of the large contracts for Lehigh and North River irons have been booked, and the market appears to be resting, whether as the effect of "the sober second thought," or as preparatory to a fresh bound upward, it is as yet impossible to say.

There is a good deal of iron held for speculation, and if the market should remain quiet and without excitement, or advance for a short time, no doubt much of this would come out, and the apparent scarcity of iron would disappear, and a more settled and permanent condition of the market would follow.

We quote \$21 @ \$22 for No. 1 X, standard Lehigh brands, and No. 2 X, \$20 @ \$20.50. We hear Saulsbury charcoal pig quoted at \$32 @ \$35. Some Southern charcoal iron is held here, but is not in the market.

From every part of the country, our reports appear to indicate something of the feeling we have just endeavored to express, that pig-iron is very strong and firmly held, with a certain degree of uncertainty as to the future, the sanguine ones saying, "It will go up;"

the more experienced and conservative saying, "It is high enough;" and every one admits that it would be very injurious to the industry should prices go to a point where they could not be maintained.

As we have frequently said, there is no danger of an iron famine: there is a good deal of iron held as a speculation that will come out just as soon as it is generally understood that the top is reached; a good deal more iron will be made during the year than ever before; and there is nothing that we can see, that need make manufacturers anxious; or, on the other hand, that will justify any "booming" of the price of pig.

The price of what is known as "Ohio Scotch pig" has advanced to a point, \$24@25 a ton, at interior points in this State, that manufacturers who have heretofore been using it are coming into this market to buy the foreign article.

A dispatch from St. Louis to-day says that the Strickle, Harrison & Howard Iron Company, of that city, in consequence of its inability to obtain sufficient supplies of pig-iron from the South, has contracted for 10,000 tons of No. 3 Middlesborough, England, foundry for immediate shipment via New Orleans. The price is about \$21, duty included, on the wharf in St. Louis which is \$1 less than the present quotations on a similar grade of iron from the South.

Scotch Pig.—Prices here have again moved upward, though they are not yet at the point where a profit can be made on the present Glasgow prices. We quote Coltness, \$23; Summerlee, \$22.50; Clyde, and Dalmellington, \$21; Gartsherrie, \$22.50; Glengarnock, \$21@21.50; Eglinton, \$20.50. Glasgow cable quotations to the Metal Exchange to-day are as follows:

Cables to the Metal Exchange to-day quote: Coltness, 59s. 6d.; Langloan, 55s. 6d.; Summerlee, 56s. 6d.; Gartsherrie, 55s.; Glengarnock, 52s. 3d.; Dalmellington, 49s.; Eglinton, 48s. 9d.; Warrants, 46s. 9d.; Middlesboro', No. 3, 36s. Freight are 10s.

Bessemer Pig.—This market is quiet, and very little new business is doing. We quote \$19@20 at furnace for Domestic. Foreign is purely nominal at \$20@21.

Spiegeleisen.—We quote \$28@29 asked for both English and German 20 per cent Spiegel, \$33 for 30 per cent.

Steel Blooms and Billets.—We quote \$30@30.50 for Rail Blooms. Billets, \$31@32, according to size and quality. Nail Slabs, \$32@33. American Charcoal Blooms, from \$54@56. Scrap Blooms, \$35@36.

Steel Rails.—Very little is doing, and prices quoted are for the most part purely nominal, and what is hoped for, rather than what is received—\$40—seems still the point aimed at. It has not been reached. Perhaps \$38@39 would be nearer a fair quotation; for though sales may "figure out" in some cases less than this, they are exceptional.

Structural Iron and Steel.—The mills are well supplied with orders, and prices are firm but quiet. We quote: Bridge Plate, 2'4@2'5c.; Angles, 2'1/2@2'3/4c.; Tees, 2'1/2@2'3/4c.; Steel Angles, 2'5@2'6c. American Beams and Channels, 3@3'1/2c., base from dock.

Steel Plates.—We quote: Tank, 2'75c.; Boiler and Ship Plates, 3'1/4c.; Flanges, 3'1/2@3'3/4c.; Extra Flange and Fire-Box Plate, 4'1/2@4'3/4c.

Merchant Steel.—There is no change from the Association rates. We quote: American Tool Steel, 7'1/2@10c.; special qualities, 11@20c.; Crucible Machinery, 4@4'5c.; Bessemer and Open-Hearth Machinery and Spring, 2'7c.; Sleigh Shoe, 2'4c.; Open-Hearth and Bessemer Cutlery, 3'2c.

Plate Iron.—We quote: Common Tank, 2'45@2'50c.; Refined, 2'50@2'60c.; Flange Iron, 3'7@3'8c.; Extra Flange, 4'25@4'3c.

Bar Iron.—We quote: Refined at 2@2'1/4c.; Common, 1'8@1'9c. These prices show a further advance.

Cast-Iron Pipe are quoted at \$32 for 36-inch pipe, up to \$37 per ton for 4-inch. Prices obtained on larger contracts are to be found on another page under the heading "Bids on Contracts."

Rail Fastenings.—We quote Spikes, 2'25@2'3c. a pound; Angle Fish-Bars, 2@2'1/2c.; Bolts and Nuts, 3@3'1/2c.

Scrap.—We quote \$25@26 for Wrought Yard Scrap. The market is strong.

Old Rails.—The market is strong, with an upward

tendency. We quote \$25 for Tees, and \$26@26.50 for Double-Heads. English are quoted 75@78s. c.i.f. New York.

Philadelphia. Jan. 14. [From our Special Correspondent.]

A slight reaction has manifested itself in the iron market. A sentiment is showing itself against any further advance in values. In fact, doubt is expressed as to the ability of iron-makers to keep figures where they are. As to this, the best authorities say that current quotations will no doubt hold. A great deal depends on what buyers do. If they crowd in requirements, prices will advance, especially in best brands of pig and bars.

Pig-Iron.—Is selling rather sluggishly, yet not the slightest symptoms of weakness are observable. The stocks at furnaces have been about exhausted. New contracts are not sought. Forge sold to-day at \$18.50, with \$18 for Medium; No. 2 is \$19.50; No. 1, \$20@21.

Blooms.—No two brokers give the same quotations. Prices are nominally \$30@31. Small orders are placed for slabs and billets. A reaction is predicted here in foreign markets, just enough to catch a large volume of business.

Muck-Bars.—Bars are hard to get. Mills are all oversold. A little business was done yesterday at \$33 at mill.

Manufactured Iron.—Less business has been done for six days. Some country mill-owners have had a good run of orders for medium iron at 1'85@1'90c. Local manufacturers see no occasion for soliciting business at the present unsatisfactory margins. With Muck-Bars at \$33@33.50, and Old Rails at \$25, and Gray Forge at \$18 delivered @18.50, there is not much in iron at 1'90@2'10c.

Plate and Tank.—To-day's mails brought inquiries for a few hundred tons. Some makers have shaded December prices for spring delivery in large lots. The capacity has been expanded somewhat since last summer and manufacturers are looking out for early spring. Quotations are 2'40c.

Sheet.—Firm prices are quoted all around. Cast Pipe.—The past season has been a profitable one.

Steel.—All the manufacturers report a slight improvement in prices.

Structural Iron.—Angles are 2'15@2'20c.; Beams, 3c. Inquiries are again returning, and mills have made recent additions to their healthy volume of booked business.

Steel Rails.—Big buyers are in a quandary as to whether to buy or not. Makers are perfectly indifferent, and in some cases have responded this week that they were not in a position to accept propositions. Prices range nominally at least from \$38@40; but what selling prices are is another question. Brokers estimate inquiries to-day at 30,000 tons, and in a few days they will double these figures.

Old Rails.—Quotations, \$25; some want more. Double-Heads are held at some \$26, but every thing is unsettled.

Scrap.—Very little is to be had, and quotations are nominal, although brokers have standing offers at \$23 for cargo. Very little selected is to be had since the bad weather set in.

Pittsburg. Jan. 13. [From our Special Correspondent.]

Notwithstanding the fact that the sales of raw iron for the past four months exceed three hundred and eighty thousand tons, all for legitimate consumption, the demand continues active, and the sales for the season unusually large. Those who looked for a large falling off at the close of the old and the opening of the new year have been agreeably disappointed. Generally speaking, prices show but slight change, as compared with last week, any change made being in favor of sellers. We are daily asked what will be the next move. As we neither buy nor sell, we have no opinion to offer. Our business is to collect facts and report transactions exactly as they take place. There our duty to all parties ends. The volume of business is steadily expanding in this direction, and during 1887 will undoubtedly reach proportions never before seen in this country. The stock of pig-iron in this market has been steadily reduced since the first of the year by liberal transactions and supplying previous sales. Brokers whose furnaces have been sold ahead for some time are looking out for others at various points. The fact is daily becoming more apparent that Pittsburg is bound to be the great iron market

for this country. The receipts of imported iron, old and new, are steadily increasing, and if all the sales of imported iron were published, it would read like a romance. The iron trade, in all its phases, presents a very healthy appearance, and, should nothing occur to stop our progress, the trade of 1887 is certain to beat all previous records. The following are the latest quotations made from actual transactions:

Table with 2 columns: Item and Price. Includes categories like Coke or bituminous, Foundry No., Gray F., White, Mottled, Silvery, Bessemer, Charcoal, and various iron products like 20 p. c. Spiegel, Muck-Bar, Steel Blooms, etc.

Table titled 'SALES SINCE LAST REPORT.' Lists various iron and coal products with prices and quantities, such as 2000 Gray Forge, Lake Ore, 1500 Gray Forge at Furnace, etc.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Jan. 14.

Statistics.

Production Bituminous Coal for week ended January 8th, and year from January 1st: Tons of 2000 pounds, unless otherwise designated.

Table titled 'EASTERN AND NORTHERN SHIPMENTS.' Compares weekly and yearly coal production for 1887 and 1886 across various regions like Phila. & Erie RR, Cumberland, Md., etc.

Total... 176,390 176,390 116,582 116,582 * Tons of 2240 lbs.

WESTERN SHIPMENTS.

Table titled 'WESTERN SHIPMENTS.' Compares weekly and yearly coal production for 1887 and 1886 for regions like Pittsburg, West Penn RR, Southwest Penn RR, etc.

Total... 55,118 55,118 41,713 41,713 * Report not received. The total production of the Chesapeake & Ohio Railroad, region in 1886, was 1,207, 954 tons. The report was received too late for last week's issue.

Production of Coke on line of Pennsylvania RR for week ended January 8th, and year from January 1st: Tons of 2000 pounds.

Table titled 'Production of Coke on line of Pennsylvania RR.' Compares weekly and yearly coke production for 1887 and 1886 across various regions like Alleghany Region, West Penn RR, etc.

Production Anthracite Coal for week ended January 8th, and year from January 1st:

TONS OF 2240 LBS.	1887.		1886.	
	Week.	Year.	Week.	Year.
P. & Read. RR. Co.	98,638	98,638	110,934	110,934
L. V. RR. Co.	114,431	114,431	77,923	77,923
D., L. & W. RR. Co.	90,187	90,187	100,478	100,478
D. & H. Canal Co.	84,555	84,555	84,157	84,157
Penna. RR.	42,384	42,384	43,583	43,583
Penna. Coal Co.	20,000	20,000	18,800	18,800
Penna. Canal Co.	450,195	450,195	435,865	435,865
Total	14,330			
Increase				
Decrease				

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Production for corresponding period:

1882	956,094	1884	589,726
1883	990,793	1885	573,089

Anthracite.

Owing to the strike of the coal-handlers, there has been practically no business since our last. The very little coal that has been handled has been to supply pressing contracts. Sales are made for future delivery, according to the ability of the companies to ship the coal, at prices that prevailed before the strike began. The retail dealers who are fortunate enough to have coal are reaping a harvest. They are getting an advance of from 75 cents to \$2 a ton over the prices that prevailed two weeks ago. As to the outcome, or probable duration, of the strike, predictions are useless. Both parties appear to be firm in their positions; but we believe that before another week is over, business will be resumed.

The Delaware & Hudson is handling its coal with full force, and without interruption. The New Jersey Central, being in the hands of a receiver, and therefore under the immediate control of the court, yesterday received an order from court to notify every one that interference with its business means "contempt of court," and the marshal is ordered to afford all necessary protection.

The other companies will, no doubt, now pluck up courage to go to work, and the strikers, who have already inflicted much suffering and a loss of probably hundreds of thousands of dollars on the poor of this and neighboring cities, deserve the severest possible punishment for inflicting so wanton an injury on the poor. Dealers on the west and east side are reaping a harvest from the poor, and in many cases from the strikers themselves. On Monday, they asked \$7.50 for a ton; now they want \$8 and \$9 a ton, and as much more as they can get. Those who sell coal by the sack, bushel, and pail have increased the price enormously. The pail that ten days ago cost from 8 to 10 cents now costs the poor man from 18 to 20 cents. Coal by the bushel has jumped from 25 to 30 and 35 cents, and by the sack from 50 to 65, 70, and 80 cents, according to the character of the seller and the necessity of the buyer. The strike pinches the poor far worse than it does the rich.

The Knights of Labor have never before backed a strike that has reacted as promptly and decidedly upon themselves as the present one of the coal-handlers. If it should last two or three weeks more, and the weather should be as severe as it has been, they would pay dearly for the encouragement they are giving the strikers in the present instance. The workingman is not able to put in a winter's supply of coal, but is a continuous buyer in a small way at high prices, and it is this class, and this alone, that has suffered by this senseless strike.

It is almost certain that the curtailment in production that would be brought about should the strike continue for two weeks longer, would greatly benefit the coal companies. The strikers are accomplishing for the companies what the latter could not accomplish without producing a howl of public indignation and probably more important strikes.

The present strike has developed a shortness of supplies that was but little suspected. This is probably due to the fact that dealers, in their past experience, have discovered that during January prices are usually low, and that they have permitted stocks to run down, expecting that the same conditions would rule this year. The companies have now a chance to secure good prices as long as the cold weather lasts, provided they act wisely. There is danger, however, of their overestimating the demand that will follow the termination of the strike and of their soon making prices weak again.

Nothing is heard of the next coal combination. Such

average prices upon last year's business as have recently come to light are not very encouraging. Those of the Delaware, Lackawanna & Western, the Lehigh Coal and Navigation Company, and the Reading Company show that, under the workings of the coal combination, they have been steadily declining. This, however, is not attributable so much to the plans of combination, as to the blunders of the managers of the companies. There are some very great chances for big blunders this year. We shall be greatly surprised if the managers do not avail themselves of them.

Bituminous.

There is but very little of this coal for sale. It is stated that \$4 a ton alongside is a low price; that \$4.50 has been paid; and that \$5 a ton is obtainable in instances. Cars are still scarce. The miners are talking of an advance of 10 cents a ton for mining. They assume that the companies are in earnest in their efforts to get higher prices for coal and that labor should have its share. The railroads, of course, will want their proportion, so a pretty good advance in the price of coal will be necessary to give the producers a profit. It is stated that the formation of the combination has made satisfactory progress during the week.

Buffalo.

Jan. 13.

[From our Special Correspondent.]

Mr. Millard S. Burns, of the firm of Messrs. Palen & Burns, was a candidate at the election held on the 12th inst., to represent the coal interest in our Merchants' Exchange. For want of a sufficient number of votes, he was not elected.

Secretary Thurstone read an interesting report at the annual meeting of the said Exchange, held yesterday. It was prepared by Mr. T. Guilford Smith, the chairman of the Coal Committee. Thinking it well worth preserving, it is presented herewith entire:

COAL COMMITTEE.

The influence of this committee has been brought to bear upon the shippers of coal at this port successfully, in getting them to meet frequently on the Exchange, and finally to have daily meetings, at which harmonious action was taken in reference to the rates of freight to the upper lakes. We hope that the same harmony will exist during 1887, which prevents the violent fluctuations in transportation charges, which are so disastrous to our business.

The facilities for receiving and shipping coal at this port are constantly increasing and improving. We believe that very considerable improvements are still in contemplation by some of the large shippers, to accommodate the constantly increasing tonnage arriving here, both for lake shipments and rail transfer.

The permanent displacement by natural gas at Pittsburg of large bituminous coal tonnage has caused the miners of that coal to seek new markets during the past season; and for years to come, we think that Pittsburg coal is likely to become an important factor in the bituminous coal shipped to this city; and, it is to be added, to that shipped from the Reynoldsville region and from the Dagusahonda mines. The season of 1886 opened rather sluggishly, and prices continued dropping until about mid-summer, when the market braced up very decidedly, and has continued active and advancing up to the present time. This was very much emphasized by the scarcity of cars, which still continues, so that a good deal of the tonnage that really might have been included in that of 1886 will not appear until 1887. This, however, leaves the trade in a very healthy and active condition, and we hope for good prices, and continued activity during the ensuing year. Thus far, the arrival of natural gas has not materially affected the local consumption of coal, partly because its distribution has not yet fairly begun, and also because the citizens generally are not likely to enter upon its use too hastily. In fact, if, as predicted by the experts in the neighborhood of Pittsburg, the natural gas supply at some near future time gives out, we think that its introduction will simply lead to the substitution of gas for coal as a fuel, and that, whenever the time comes, artificial gas will take the place of the natural, ultimately leading to a large consumption of coal for the purpose of its manufacture.

One of the features of the season of 1886 has been the small tonnage arriving at this port through the Erie Canal. The statistics showing the arrival by rail and canal at Buffalo, and the shipments of lake and by rail, are not yet at hand, so that it is impossible to give these at this writing; but the same

will be embodied at an early day in the report of the Exchange, when printed.

In 1885, the attention of your committee was drawn to the large losses incurred by our shippers of coal to this city, in consequence of the stealing of coal from the trains while standing on tracks, and an effort was made to have some hearty co-operation on the part of the railroad, as well as of the shippers of coal themselves, toward protecting this coal from this petty thieving. Unfortunately, no definite action resulted from the efforts at that time, nor was the matter taken up again in 1886. In fact, the condition of some of the railroad and coal companies shipping here renders it impossible for them to enter into any comprehensive scheme for this purpose; and, to make it, it should embrace all who ship here at all. It is hoped that this subject may be taken up during the ensuing season, and some effort made to in some way prevent the large losses that are incurred by all from this petty stealing. The committee has already alluded to the increased facilities that individual shippers are disposed to make for the more speedy transaction of their business here, and notes with satisfaction the large appropriations made by the national government for completing the break-water, and otherwise adding to our harbor facilities.

There are no changes in the quotations for coal or coke.

It is a source of regret to hear of the anticipated strikes in the Pennsylvania coal districts. It is to be hoped that wise counsels will prevail, and some adjustment of wages be decided upon, especially in view of the excellent demand now prevailing in all directions for coal, and the bright prospects for business for the present season and year.

News was received here yesterday that Chicago is "hard up" for anthracite coal, that prices will be advanced to-day, and that the scarcity of cars is a great factor for this state of affairs.

The annual report of Mr. Gardner, the President of the Buffalo, New York & Philadelphia Railroad, for 1886, shows a material increase of earnings, the aggregate being \$2,624,000, as against \$2,393,000 in 1885. During the last half of the year, the local miscellaneous tonnage increased 75 per cent. If the bituminous coal trade, which is the staple freight of this line, had not been in such a demoralized condition, the railroad would have really made a very encouraging exhibit. As it is, the general conditions are favorable, and it is only a matter of time when the Buffalo, New York & Philadelphia will be a paying property.

Boston.

Jan. 12.

[From our Special Correspondent.]

When we talk about prices of coal this week, they must be taken as entirely nominal. Boston is getting no anthracite coal from New York. Indeed, New York has shipped no coal of any kind, save a small amount of bituminous. The strike of the coal-handlers there for an increase of wages, comes just at a time to disturb matters very much; for there is only a small stock at tide-water, at the best. For this reason, the local demand makes up in urgency what it lacks in amount, and causes an active market. The only thing that consoles the anthracite jobber is, that the New York disturbance may after all be a blessing in disguise. It should not be forgotten that we are having no severe winter weather in New England this year. There has been an unusual amount of snow; but the zero days may be counted on the fingers of one hand. For that reason, the artificial famine caused by the strike may be a good thing to stiffen up prices. This is based on the idea, however, that there shall not be too much of a good thing; that is, too long a strike. Spot coal would command high prices according to the exigency of the consumer. Nominally, Stove coal ranges from \$3.75@4.15 f.o.b. at New York; Egg, at \$3.65@3.80; Broken, \$3.30@3.55; Nut, \$4; Pea, \$3. The two latter sizes were practically out of the market before the strike.

There are a number of buyers who would gladly pay \$4 delivered for a cargo of bituminous, large or small. There is none to be had, however. Unless dealers are uncommonly close in their movements, there may fairly be said to be no contract talk at this port at the present time. Higher prices are freely predicted, whether the pool works well or ill, the basis of the prediction being a largely increased consumption. Agents show less willingness to load up with early orders than for a long time.

Freights are very strong, and quite erratic.

DIVIDEND-PAYING MINES.

NON-DIVIDEND-PAYING MINES.

Main table with columns for Name and Location of Company, Capital Stock, Shares, Assessments, Dividends, and Shares. It lists numerous mining companies and their financial details.

G. Gold. S. Silver. L. Lead. C. Copper. * Non-assessable. + This company, as the Western, up to Dec. 10th, 1881, paid \$1,400,000. † Non-assessable for three years. ‡ The Deadwood previously paid \$275,000 in seven dividends, and the Terra \$75,000. Previous to the consolidation in Aug., 1884, the California had paid \$31,320,000 in dividends, and the Con. Virginia \$43, 200,000. § Previous to the consolidation of the Copper Queen with the Atlanta, Aug., 1885, the Copper Queen had paid \$1,350,000 in dividends.

NEW YORK MINING STOCK QUOTATIONS.

DIVIDEND-PAYING MINES.

NON-DIVIDEND-PAYING MINES.

Table with columns for Name and Location of Company, Date (Jan. 8-14), and Sales. It lists various mining companies like Alice, Argenta, and Alta, with their respective stock prices and sales figures.

BOSTON MINING STOCK QUOTATIONS.

Table with columns for Name and Location of Company, Date (Jan. 7-13), and Sales. It lists various mining companies like Amie, Allouez, and Arnold, with their respective stock prices and sales figures.

New York: Dividend shares sold, 24,614. Non-dividend shares sold, 212,240. Total New York, 236,854. Boston: Dividend shares sold, 9,082. Non-dividend shares sold, 28,476. Total Boston, 37,558.

COAL STOCKS.

Table with columns for Name of Company, Par value of shares, Date (Jan. 8-14), and Sales. It lists various coal companies like Barclay Coal, Cameron Coal, and Col. C. & I., with their respective stock prices and sales figures.

San Francisco Mining Stock Quotations.

Table with columns for Name of Company, Date (Jan. 7-13), and Sales. It lists various mining companies like Albion, Alpha, and Argenta, with their respective stock prices and sales figures.

* Of the sales of this stock, 33,134 were in Philadelphia, and 240,520 in New York. † The quotations for these stocks are not percentage, but actual price.

Total sales, 583,348.

We quote vessel rates, exclusive of discharging, as follows:

New York, 85@95c.; Philadelphia, \$1.25@1.35; Baltimore, \$1.40@1.50; Newport News and Norfolk, \$1.15.

There is a lifeless trade at retail, owing to the absence of steady cold weather. Prices are unchanged.

Pittsburg. Jan. 13.

[From our Special Correspondent.]

Navigation is suspended from the head-waters of the Monongahela to Memphis, Tennessee. The pools are all frozen, and likely to remain so for the present. Generally speaking, we have a January rise and a coal shipment. Whether the present one will be an exception, will be for the next seventeen days to decide. A number of tow-boats that left on the December rise failed to return, and are tied up on the way, waiting for more water, less ice, and milder weather. We have no change to note in regard to the situation in the price of coal. The current rates of coal afloat in the Monongahela pools are: Second, 4 $\frac{3}{4}$ @5c. per bushel; Third Pool, 3-80@4c.; Fourth Pool, 3 $\frac{1}{2}$ @3 $\frac{3}{4}$ c. Railroad, 4 $\frac{1}{2}$ @5c.

Coke.—The demand exceeds the supply. Rates are unchanged. Blast-Furnace, \$1.50 f.o.b. cars at ovens; Foundry, \$1.75; Crushed Coke, \$2.25.

FINANCIAL.

NEW YORK, Friday Evening, Jan. 14.

The mining market during the week under review has been without any special features, and on the whole has been dull and uninteresting. Prices were lower in most cases, and few stocks showed an upward tendency.

The stock of El Cristo Mining Company, though suffering from the reputations of some of those connected with bringing it here, is yet given as a "point" to buy. We stated last week that the Standard Oil Trust has an option on a large block of the stock. This may be the basis of the "point" that the stock is to go to \$25; but we hear no intimation that the mine is good. The report to the committee of the Consolidated Stock and Petroleum Exchange is not satisfactory, and the company has been given ninety days in which to produce titles and papers, and to answer certain questions that have been asked. During the past week, the price ranged from \$2.50@3, with sales of several thousand shares.

The meeting of the stockholders of the Sutro Tunnel Company, held on Wednesday, was largely attended. It was called for the purpose of securing delay in the foreclosure proceedings, to which we have previously referred in the JOURNAL, of McCalmont Brothers, of London. The suit is pending, and we learn that the final hearing will be held in the United States Circuit Court, in Nevada, in March. Theodore Sutro presented for the signatures of stockholders a petition to the court reciting that the McCalmonts, as holders of the mortgage, had acquired complete control of the company through the ownership of a bare majority of the stock, and that, by the proposed foreclosure, the rights of the minority stockholders would be extinguished. The petition asks that the final hearing be postponed, to enable the minority stockholders to protect their rights, and that the signers be allowed to defend the suit by separate counsel. A resolution approving the proposed plan was adopted unanimously, and the following committee in behalf of the minority stockholders was appointed: H. H. Thayer, Bryce Gray, J. C. Rieff, L. von Hoffman & Co., H. R. Baltzer, H. Stursburg, Palmer & Lowengard, as agents, Simon S. Stone, Charles F. Tag, J. S. Bernheimer, C. W. Smith, R. Martinson, and John Pondir. All the members of the committee have signed the petition, which will soon be forwarded to Nevada. Among the statements read at the meeting was one that in the first six months of last year the company had earned \$20,000 a month, and that since November 1st the earnings had been at the rate of \$40,000 a month. The stock, which again has been the most active on the list, was weak, and declined from 35c., at which price it opened on Saturday, to 19c. to-day, with sales of 152,300 shares. The Comstocks generally were lower, and the announcement of a dividend of fifty cents a share by the Consolidated California & Virginia Mining Company, payable this week, did not affect the price of the stock. It has steadily declined. On Saturday, it sold at \$27.13; and on Thursday, at \$20.50, with but few sales. Hale & Norcross declined

from \$9.25@9.75. Sierra Nevada, from \$7.75@8.37. Mexican, from \$8.50@8.87. Best & Belcher shows but few sales at from \$10.50@10. Savage, one at \$10.50. Gould & Curry, one at \$6. Ophir advanced from \$11.50@12.25.

Among the other Nevada stocks, the assessments levied by the Navajo and the North Belle Isle had a depressing effect on the price of these stocks; the former declining from 82@60c., and the latter from \$3.75@3.15. Belle Isle was quiet at 45c. and 35c.

The "cats," State Line 1 & 4 and 2 & 3, contributed considerable amusement at 4c. and 6c. Oriental & Miller was quiet, and stood at 14c. and 16c.

A dividend of \$1.50 a share has been declared in the preferred stock of the Quicksilver Mining Company, which continued to advance from \$30.87@33 on Thursday, but declined again to-day to \$30.50, with sales of 5050 shares. The Common stock shared in the interest taken in the Preferred, and advanced in the beginning of the week from \$8.13@8.75, declining to-day to \$7.50.

The stock of the Stanislaus Mining Company, to which we referred in our last issue, showed sales of some 600 shares at from 85c.@1. Gold Stripe was quoted at 6c.; and Green Mountain, at 45c.

The Bodie stocks were again entirely neglected. Bodie Consolidated showed a downward tendency, going from \$3.15@2.70. Bulwer, from \$1.50@1.15. Standard was firm at \$1.20. Mono, at \$3. Consolidated Pacific, at 11c.

The stock of the Phoenix Mining Company, which is selling at the Stock Exchange among the unlisted securities, by manipulation has advanced to \$11.37 $\frac{1}{2}$. A short time ago, it was quoted at \$8.

Much interest was manifested in Colorado stocks, and transactions are recorded in almost all the stocks on the list. The largest business is recorded in La Crosse, which was active at 15c. and 17c.; in American Flag at 14c. and 17c.; and Red Elephant, at 5c. and 6c. The latter is one of those stocks that exist only on paper. Dunkin shows sales at from 35@40c. Silver Cliff advanced during the week to 35c., but declined to day to 23c. Chrysolite varied from 67@61c. Leadville, from 75@73c. Little Chief, from 28@30c. Iron Silver, from \$2.50@2.55. Bassick, at from 22@20c. Breece, 35c. Robinson, 45c. Freeland, \$1.

Homestake, which has of late been advancing and declining from \$10@20, opened this week at \$15, and declined to \$12.50, the last sale made yesterday. Deadwood-Terra was firm at from \$2.25@2.40. Caledonia, at from \$1.20@2.25. Father de Smet, at from 80@78c. Iron Hill, at from \$1.20@1.10.

Rappahannock continues to be a favorite stock, and sales were made at from 17@20c.

Castle Creek shows transactions of 1000 shares at from 12@13c.

Alice was quoted at \$1.50.

Silver King stood at \$7.

The total transactions for the week were 236,854 shares, showing an increase of 96,152 shares, compared with the preceding week.

A circular has been issued to the stockholders of the Stormont Mining Company, stating that the company is now out of debt, and has a cash balance of \$2576 in the treasury. But since this amount is not sufficient to carry on development-work on a larger scale, in order to prove the company's property, the stockholders have been asked to subscribe for the treasury stock, at ten cents a share, to the amount of thirty-six per cent of their holdings. The only claims now worked by the company are the Buckeye and the Last Chance. The old Stormont mine has not been worked for several years, and is now filled with water. It is believed that this mine contains better ore than has been mined since from other localities on the company's property, and that, with proper machinery erected and the necessary development-work done, it can again be put upon a dividend-paying basis. The stock on this market during the week was active at 11 and 12c. with larger sales than in previous weeks. Ontario shows sales of a few hundred shares at prices ranging from \$23@22. Horn-Silver was quiet, with little doing, at \$1.70@1.75.

Coal Stocks.

During the past week, confidence has been considerably recovered in investment and speculative circles. A free discussion of the Inter-State Commerce Bill has rather tendered to popularize it with the public than otherwise. The general impression is, that the bill will

pass; but, at the same time, it is thought that its influence on the value of securities has been pretty well discounted, and that the railroad managers will find that, in complying with it, it will become a bull argument.

The European political news had a slightly disturbing influence this afternoon, but there is an inclination to await to-morrow's dispatches before acting. If consols and other government securities should decline our market would probably act in sympathy.

The anthracite coal stocks have been without special feature.

Norfolk & Western is well spoken of. It is expected to become a part of the Richmond Terminal deal.

Hocking Valley advanced upon the election of a new and strong board of directors. Much higher prices are expected for this stock, but not necessarily at present. The Huntington party is said to control 40,000 shares of the stock, while the Vanderbilt interest is supposed to be large holders.

The bituminous coal stocks are strong under the progress of the new pool.

Cameron coal is being thoroughly exposed by the press; but the manipulators have caught a short interest and are holding up the price of the stock to force a settlement. One party short of the stock is said to have paid \$12,000 during the week in a private settlement.

The exposé in the Herald of January 8th should induce the Stock Exchange to prohibit dealings in the stock, and whoever has bought would no doubt have a good case against the gang that is "working" this precious enterprise. This appears to be one of the wildest of the cats that has for some time been dealt in here.

The Cameron Coal Company has procured from Judge Patterson, of the Supreme Court, a preliminary injunction restraining Soutter & Co., William K. Soutter, individually, and Morris S. Miller, individually, and as assignee of Soutter & Co., from in any way disposing of its bonds now in their possession.

Meetings.

The annual and special meetings of the following companies will be held at the times mentioned:

Chartiers Valley Natural Gas Company, Hamilton Building, Fifth avenue, Pittsburg, Pa., January 20th, at two o'clock P.M.

Copper Queen Consolidated Mining Company, No. 39 Wall street, New York City, January 20th, at two o'clock P.M., special meeting.

Crane Iron Company, No. 224 South Fourth street, Pittsburg, Pa., February 9th, at twelve o'clock M.

Minas Prietas Mining Company, No. 18 Wall street, New York City, January 20th, at twelve o'clock M.

Oxford Gold Mining Company, No. 52 Broadway, Room 64, New York City, February 1st, from twelve o'clock M. to two o'clock P.M.

San Juan & New York Mining and Smelting Company, Room 5, No. 31 Nassau street, New York City, January 17th, at half-past three o'clock P.M.

San Sebastian Gold Mining Company, No. 145 Broadway, New York City, January 26th, at two o'clock P.M.

Vermont Marble Company, No. 18 Broadway, Room 708, New York City, January 27th, twelve o'clock M.

Dividends.

Adams Mining Company, of Colorado, has declared dividend No. 37, of ten cents a share, or \$15,000, payable on the 21st inst., at the Farmers' Loan and Trust Company, Nos. 20 and 22 William street, New York City.

Big Bend Hydraulic Mining Company, of Dakota, has declared dividend No. 36, of three cents a share, or \$6000, payable on the 20th inst., at No. 181 Broadway, New York.

Chartiers Valley Gas Company, of Pennsylvania, has declared quarterly dividend No. 1, of 2 $\frac{1}{2}$ per cent, payable on the 31st inst., to the stockholders of record on the 5th inst., at Pittsburg. The dividend is on the old stock.

Colorado Central Consolidated Mining Company, of Colorado, has declared dividend No. 14, of five cents a share, or \$13,750, payable February 10th.

Commonwealth Mining Company, of Colorado, has declared a dividend of 8 per cent on the capital stock, payable at Chicago.

Consolidated California & Virginia Mining Company, of Nevada, has declared dividend No. 2, of fifty cents a share, or \$108,000, payable on the 10th inst., at San Francisco.

SPECIAL NOTICES.

FREE ADVERTISING.

Inquiries from employers in want of Superintendents, Engineers, Metallurgists, Chemists, Mine or Furnace Foremen, or other assistance of this character, will be inserted in this column WITHOUT CHARGE.

The labor and expense involved in ascertaining what positions are open, in gratuitously advertising them and in attending to the correspondence of applicants, are incurred in the interest and for the exclusive benefit of subscribers to the ENGINEERING AND MINING JOURNAL.

Applicants should inclose the necessary postage, for forwarding their letters.

141 WANTED—BY AN ELECTRIC TRAC-
tion Company, a superintendent, who must be a skillful engineer and mechanic, with some knowledge of electricity. A first-class position for the right man. Address, with particulars, **ELECTRIC,**
Care of ENGINEERING AND MINING JOURNAL.

152 WANTED—A SUPERINTENDING
Engineer for large works engaged in the manufacture of general machinery in an Eastern City. Experience required. Address, with full particulars, etc., **EASTERN,**
Care of ENGINEERING AND MINING JOURNAL.

155 WANTED—A DRAFTSMAN ON
machine tool work. Address, with references, stating salary expected, etc., **TOOLS,**
Care of ENGINEERING AND MINING JOURNAL.

156 WANTED—TWO PATTERN MAKERS,
experienced in pump-work. Address, with particulars, **PUMP,**
Care of ENGINEERING AND MINING JOURNAL.

159 WANTED—A YOUNG MECHANICAL
engineer, whose tastes incline toward marine work; must be able to make working drawings, indicate engines, etc. Address, with particulars, etc., **BRIDGE,**
Care of ENGINEERING AND MINING JOURNAL.

160 WANTED—A ROLLING MANAGER
for a bar-mill near Philadelphia, containing bar-guide and muck trains. Permanent position to a competent man. Address, with references, stating experience, etc., **MUCK,**
Care of ENGINEERING AND MINING JOURNAL.

161 WANTED—A DRAFTSMAN WHO HAS
had practical experience in machine design. Address, stating age, experience, references, and salary wanted, **YALE,**
Care of ENGINEERING AND MINING JOURNAL.

162 WANTED—A PROFESSOR OF MATHE-
matics in a Western School of Mines; salary, \$150 a month for first six months, after which it will be increased. Address, with particulars, **MATHEMATICS,**
Care of ENGINEERING AND MINING JOURNAL.

SITUATIONS WANTED.

SITUATION WANTED—YOUNG MAN WHO
has had five years' practical experience in the machine-shop, and in crushing, concentrating, roasting, chlorination, and assaying gold ores, desires position as assistant superintendent or foreman of any department. *Chance to rise more important than large salary.* Excellent references. **J. E. R.,**
Care of ENGINEERING AND MINING JOURNAL.

WANTED—METALLURGIST WANTS
position; large experience in copper smelting and refining, treatment of copper, silver, and gold-bearing ores by wet processes, etc. Designing and erection of water-jacket. Reverberatory furnaces a specialty. First-class references. Address **METALLURGIST**
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A CHEMIST, OF HIGH STANDING AND
long and varied practical experience will accept situation as chemical adviser or director of any chemical manufacturing operation, at a very moderate salary. Address **CHEMICAL EXPERT.**
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A CIVIL AND MINING ENGINEER IS
open for engagement in any healthy country: useful languages. Land surveying, railroad construction, gold and silver mining and milling preferred. Address **"HEALTH,"**
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GER.—Englishman, experienced as above, will shortly be open for engagement. Apply to H. D.,
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WANTED—A POSITION BY A MINING
Engineer of twelve years' practical experience in the mining and developing of coal and iron lands; best of references. Address, **MINING ENGINEER,**
Care of ENGINEERING AND MINING JOURNAL.

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iron ore lands, large bodies of yellow pine and hard wood, splendid business lots in City of Birmingham, for sale by **HILLEARY & KEITH** Birmingham, Ala.

LOCAL AGENTS FOR SALE OF KEY-
stone Boiler Compound now being appointed. Special territory assigned. Address, with statement of qualifications and reference, **KEYSTONE CHEMICAL CO.,**
225 S. Front Street, Philadelphia.

DIAMOND DRILL FOR SALE—AMERICAN
Diamond R. B. Co.'s make, with 700 feet of drill-rods, and all necessary connections in good working order. Takes 1½ inch core. Address **L. C. BIERWIRTH, Sec.,** Dover, New Jersey.

DIVIDENDS.

QUINCY MINING COMPANY.

New York, Jan. 11, 1887.

DIVIDEND NO. 37.

FOUR DOLLARS per share, will be payable February 15th next to registered holders, 22d inst. Stockholders residing in Massachusetts will be paid at the office of Mr. N. H. Daniels, Transfer-Agent, 35 Congress street, Boston. By order **WILLIAM ROGERS TODD,**
Treasurer.

PLYMOUTH CONSOLIDATED GOLD MINING COMPANY, 23 NASSAU STREET, NEW YORK, JAN. 13, 1887.

DIVIDEND NO. 45.

The Board of Trustees have declared a dividend of TWENTY-FIVE THOUSAND DOLLARS, the same being twenty-five cents per share of the capital stock of the company, payable on the 5th day of February, at the Company's offices in New York and San Francisco. **W. VAN NORDEN,** President.

OFFICE OF THE ADAMS MINING COMPANY, SECRETARY'S OFFICE, 346 BROADWAY, ROOM 41, NEW YORK, JAN. 10, 1887.

DIVIDEND No. 37.

A dividend of 10 cents per share, being Fifteen Thousand (\$15,000) dollars, will be payable to the stockholders of record on and after the 21st day of January, 1887, at the office of the Farmers' Loan and Trust Company, Nos. 20 and 22 William Street, New York City.

Transfer books will close on the 15th, and reopen on 22d day of January, 1887. **J. J. ADAMS,** President.
ARTHUR D. WILLIAMS, Secretary.

BIG BEND HYDRAULIC COMPANY.

DIVIDEND NO. 36.

The regular monthly dividend of Six Thousand dollars (\$6000) will be paid at the office of the company, No. 181 Broadway, New York, on and after JANUARY 20th, 1887. **J. W. CHADWICK,** Secretary.

MEETINGS.

THE ANNUAL MEETING OF THE SHARE

holders of the CARBON IRON COMPANY will be held at the office of the Company, No. 146 Broadway, in the city of New York, on the 27th day of January, 1887, at eleven o'clock in the forenoon.

WILLIAM BRANDRETH, Secretary.

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Used but short time; in excellent condition. Address

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